COMMITTEE WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
	)	
Preparation of the 2005	)	Docket No. 04-IEP-1
Integrated Energy Policy	)	
Report (2005 Energy Report)	)	
	)	
	)	

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET

FIRST FLOOR, HEARING ROOM A

SACRAMENTO, CALIFORNIA

FRIDAY, APRIL 8, 2005

9:00 A.M.

Reported by:
Peter Petty
Contract No. 150-04-002

COMMISSIONERS PRESENT

James D. Boyd, Associate Member

ADVISORS

Gary Klein, Advisor

Michael Smith, Advisor

STAFF PRESENT

Matt Trask

Natasha Nelson

ALSO PRESENT

Dan Howes, ITRC, Cal Poly

Steve Shaffer, COFA

Peter Canessa, APEP

Will Boschman, SWSD

Mark Roberson, PhD

Robert Wilkinson, PhD

Larry Dale, Lawrence Berkeley National Lab

John Rosenblum
Rosenblum Environmental Engineering

Gary Wolff
Pacific Institute

Lon House, ACWA

ALSO PRESENT

Andy Sienkiewich, MWD

Martha Davis, IEVA

Corey Mayers, Manager - Electric Tariffs
Pacific Gas and Electric Company

Peter Turnbull
Pacific Gas and Electric

Ann Hancock
Climate Protection Company

Gary Kah

Jane Turnbull, LWV

Bruce McLaughlin
Braun & Blaising, P.C.

Stan Kaut
Santa Clara Valley Water District

Kenneth R. Broome, P.E.
Power Wheel Associates

Edward Mainland
Sierra Club

Dave Erickson
Climate Protection Campaign

Mary Ann Dickinson, Executive Director
California Urban Water Conservation Council

I N D E X

P R O C E E D I N G S

9:00 a.m.

COMMISSIONER BOYD: I am Jim Boyd, the Associate Member of the 2004/2005 Integrated Energy Policy Report Committee. Commissioner Geesman who had planned to be here today is unable to be here today. I just talked to him on the phone a few moments ago. We will proceed without him which is no problem really.

On my right is his advisor Gary Klein, and on my left is my advisor, Mike Smith. We don't have a resoundingly large audience today, so I want to invite you all to participate at the appropriate time when we get to the more open public discussion. We will go through a prepared agenda, and Mr. Trask will take us through that shortly.

This is yet another of many many hearings being conducted by this agency in preparation for the 2005 Integrated Energy Policy Report. This is the second meeting I know that we've had on the subject of water energy and developing and the development of the water energy relationship.

The staff in the notice, which I am sure you all have seen, prepared a series of key questions that we hope to see addressed today in the conduct of this hearing. As you also saw in the notice, this agency, the Energy Commission and the Department of Water Resources have formed a very close partnership on the subject of water energy relationships, which is going to assist and aid both of our agencies in carrying out our various responsibilities and planning and prognostications I guess of the future of water and energy in this state.

A couple of comments I want to make by way of I think in pointing out the importance of this subject, but just the importance of the linkages that have been, I should say, identified in the preparation of Integrated Energy Policy Reports.

As you know, 2003 was the first report following up on the legislation that provided for this report, which many of you perhaps in the past have heard me say has provided this agency and many of its partner agencies almost a continuing forum on a host of subjects that are related to energy in this state.

On the subject of linkages, this allows

us to look at the whole system of issues and effects that involve energy for us and a lot of other issues for other agencies and other stakeholder groups, energy and the environment being just one of the major linkages. Water is a subset of that, the development, the transport, the use of water, as we have heard before, are very significant in relation to energy use.

The use of water, ultimately, results in some form of waste, and we have to treat that waste and deal with that waste, and we expend energy in dealing with that. Frankly, some of us are looking to the future of hopefully maybe even using those waste products to the benefit of our state, our society, our people, and maybe even to generate energy.

There are air quality implications, water quality implications, land effects, and certainly now we have learned what the effects upon our climate have been in and the climate change subject are all linked together. That is just a few subjects on the long list that we can develop.

The relationship between water and energy has been developed over the past several months to become a very very important relationship, and as I say, in developing that relationship, you find out all the other interfaces with so many other areas.

This has proven to be an interesting and frankly exciting opportunity for a lot of those, certainly those of you represented in the audience and those listening to this hearing today to try to link these issues together and resolve our problems.

Having spent part of my career, about eight years of it in the water business, this is a particularly intriguing subject matter for me. With that, I would like to turn it over to Mr. Trask who will be in charge of our agenda for the day. Matt.

MR. TRASK: Thanks, Jim. As Jim said, I am Matt Trask, I'm the Project Manager for the Water Energy Relationships Study. I want to give some quick sort of housekeeping items. We do have bathrooms out in the lobby in that corner over there. We have a snack bar up on the second floor if you want to grab a cup of copy of a snack.

We will be having a fairly full schedule today. I think we have ten presenters other than myself. We welcome comments throughout. Following each presentation, we are going to have some time for discussion. All I ask is if you do have a question, that if you come up to the lectern over here or virtually any seat that has a microphone so that one, the court reporter can hear you and to the folks out in web land can hear you. We are being broadcast on the web, so especially at breaks and so forth, you might want to be careful what you say near the microphones.

Just a real quick background on the study here. As Jim mentioned, this is part of the Integrated Energy Policy Report. This is a staff report, informational in nature that is going to feed into the Commission's Policy Energy Report. It is also part of the Department of Water Resources Water Plan process.

We are first focusing on the Energy Commission's process. It is very much energy focused, and then we will be shifting more to a help the Department of Water Resources once our process is through.

We have identified a need as Commissioner Boyd said to study the energy demand trends in the water sector at the same time the

Department of Water Resources has identified a need to study water demand in the energy sector.

We decided to jointly conduct this study so we can insure we have consist assumptions and prevent our duplication of effort.

The purpose of the study for the Energy Commission anyway, the first one is to very accurately or as accurately as we can assess energy demand in the water sector. That is actually a pretty controversial area as we will be getting into a little bit. We generally go by electric meter data, however, the electric meter data often cannot separate what the energy is being used for, whether it is for pumping, whether it is for the farmer's house or whatever. So, we have some problems there.

The next phase of it will be to explore the potential to reduce on-peak and total electric demand in the water sector using conservation, efficiency, and perhaps integrating some electric generation from water systems and waste water systems. Also, just to energy management, management practices especially for on-peak, ways we could shift energy use to off-peak hours.

Finally as a separate product that will

not actually be part of the Energy Policy Report, we will during the summer be developing a package of tools and programs that virtually anybody involved in the water industry, water sector, can use when they are going to be analyzing their systems, especially as to their energy needs.

Just to start today, we are going to be talking mostly about agricultural sector this morning and irrigation primarily. So, I will be doing a short presentation on that part of this morning.

This afternoon after lunch, we will go in to more of the urban sector, and actually more urban water agency load rather than end use will be the focus of this afternoon, and I will give a short presentation before that session as well to kind of kick that off.

What you see here in front of us is the data that we have for energy use total, which you can see at the bottom is nearly 254,000 GWh, and then we have broken out what we know in the water sector.

Again, this all comes from utility meter data. By the way, I have 2004 up there, but I'm not sure that is accurate. I think this is 2003 actually, these numbers, but they are not a whole lot different for 2004.

As you can see, we have nearly 12,000 GWh in the water sector. That includes all pumping for conveyance and distribution. Virtually every pump in this state that is involved in moving water is in that factor or that figure.

Treatment is about 1,400 GWh, however, we expect that will be going up considerably here in the near future because of increased treatment requirements and other things that are affecting, and that is part of what we will get to in the afternoon session.

End use is almost the same amount of energy as what it takes to get the water to the customer, about 12,500 GWh. As you can see, we have a relatively small number of irrigation, 2,269 GWh which compared to the total of 254,000 is quite small, less than one percent. However, you will be seeing in some presentations later on that estimate, like I said, this is energy data or meter data, so whatever meter is assigned as an agriculture customer, we add those all up, and that is what we get there, 2,269.

However, we have had estimates that are nearly four times that amount from other people, so that will be one of the things that we will be talking about this morning. I suspect that a lot of that has to do with the fact that we are double counting in other categories.

For instance, the Department of Water Resources uses more than 6,000 GWh of energy every year for moving water around the state. A portion of that does go to agricultural. It is a little bit hard to split it out what goes to Ag and what goes to Urban, but I think some of the difference in the numbers you see is due to that factor. That is what I have more or less I have up here in our first two bullets.

Another factor is that we are probably underestimating groundwater pumping. If you look in both our documents and the Department of Water Resources documents, groundwater pumping is just the great unknown, the great black hole of the water world where all sorts of energy and water is poured into, but we really don't know a lot about it.

I am probably one of the best examples of that. I own what is generally referred to in the water world as a "ranchette" with about five and half acres. I have one pump, one well that does everything, my house, all the irrigation I do. So, that is obviously that is not going to be accounted in an ag meter.

One other factor that may be causing this disparity in our estimates is that in the last ten years especially have been almost unprecedented shift in the type of crops that are being planted and grown in California.

The main one of those is the fact that we are shifting away from row crops rather dramatically and shifting more towards permanent crops, especially vineyards and orchards.

There was a period there I think about three years ago where every day in California more than five acres were being converted into vineyards. It is absolutely unprecedented. I think it just kind of caught everybody, all the planters by surprise.

The price of grape juice and wine has gone down considerably since then, and it has essentially been some what of a glut in the market, but we have not seen that much of a slow down in the conversion. People are still converting to vineyards. That makes a big difference.

Another big problem with the ag sector -- first I should back up a little bit here. Where we are in the study, I'm about half way through the study, and I am starting to make some preliminary conclusions about I don't know three or four weeks ago, I had kind of made the conclusion that the ag sector was not a problem. That we didn't have to worry too much about the ag sector.

Since then, all sorts of people have been trying to talk me out that conclusion, and I have a suspicion that they are right. Yes, that number we have is fairly low 2,269, less than one percent. However, it could be considerably higher than that, but there is another big factor in that all of irrigation is generally concentrated into about three months a year.

You will see that maybe six months a year that you will get some irrigation, but very highly concentrated in the hot summer months of June through August into September a little bit. Then often, the irrigators have no choice but to pump during the day time.

They have to take the water when it comes down that canal. If they don't, it floods right out. That often means that they have to pump right on peak when we are having the hardest time making our commitments to meet all the load out there.

We think based on some of the studies, there could be as much as 4,500 MW on-peak just during the peak months. That is a major load. That is almost eight good-sized power plants. As I said, there is very limited ability right now to shift that off-peak because of the irrigation system limitations.

As I said, there is very strong trend to shift to permanent crops. There is some kind of counter intuitive things that happen there, especially with vineyards. In a lot of cases, farmers that used to be all on gravity feed irrigation systems that took essentially no energy at all to work are now switching to drip irrigation.

When you are going to do drip irrigation, you have to have pressure into your lines. That means that you at least need to install a booster pump. If you are a farmer out there and you are looking at the cost of installing a new booster pump, then you realize that you've got a well pump already installed that could easily apply that pressure. You are very likely going to go to that well pump, especially since your ground water is a lot clearer a lot cleaner, and you don't have to filter it as much, you don't have to maintain the filter as much. So, when the farmers look at all those factors, often they will switch to ground water when they are going to drip. So, you will see an increase in ground water pumping which is kind of a counter intuitive thing.

Also in the agricultural world, we are seeing a lot of rather innovative exchanges in trades, a lot of lands are being idled, a lot of irrigation districts and conservation districts are selling or trading their water rights. So, we are seeing this is causing some changes in the way that water is moved around the conveyance patterns, and that will have an affect on energy use.

Another could be fairly major factor, and I say could be which kind of reflects the question mark there at the end of the bullet is electrification of agricultural pumps.

Right now, more than 80 percent of the pumps out there are electric powered. However, that is considerably lower than what you saw just fifteen years ago. Fifteen years ago it was well over 90 percent, so we have had a shift off away from electricity towards diesel power, almost all. It is about 95 percent diesel, but we think that might start shifting back. There are some new air quality rules out there that are probably going to give a lot of incentive for people to go out and find these diesel pumps and convert them to electric, or at least to a newer diesel engine and earn some air emission off sets that way.

We have also heard that PG & E has a rather aggressive program out there to electrify some of these pumps, and so we see there is a potential of maybe up to around 2,000 or even 3,000 MW of new load just from electrification. I think that is a fairly shaky number right now. I certainly wouldn't want to rely on it, but it does seem reasonable that we should probably plan on that.

Like I said, we still a lot of difficulty in shifting the load off-peak in the ag sector. They are very complex systems, hundreds of miles. The water is transported, so when you put the water into the canal, and when it gets to the end-users, often eight to ten hours apart, it is very difficult to try and manage all that so that you could get your pumping off-peak. I think we will find later that there is probably a lot easier ways to find energy savings in the water sector than trying to get these complex systems to shift their water systems around so that we can get the load off-peak.

When I look at well, do we have to worry about the ag sector, are things under control. There are some things out there that are addressing energy, either their load may be behind the curve when compared to the urban sector, but they are getting going.

A part of this came from some legislation that was passed in 1990. It is called the Agricultural Water Suppliers Efficient Water Management Practices Act of 1990. That led nine years later to a memorandum of understanding where the signatories do that MOU are pledged to enact certain best management practices, BMPs.

This is following somewhat a similar

process on the urban side, that the California Urban Water Conservation Council got started and basically is getting all the water agencies in the state or everybody that is involved in water to agree that conservation is a good policy, often most cost effective policy. In general, it is just a way to address energy use in the water sector.

We also have a very active Agricultural Pumping Efficiency Program which is being administrated by the Center for Irrigation Technology at Fresno State. Actually, we have a speaker, Pete Canessa will be talking about that in a little bit.

We also have on-going research by the Center Irrigation Technology, another very active group here in California is the Irrigation Training and Research Center, which is at Cal Poly. We also have a speaker from there, Dan Howes, and that is one area where their research has showed where as much four times the energy as our research has shown is being used in the ad sector.

We also have National Laboratories that are heavily involved. We have some people that I can see here today from both Lawrence Berkeley and Lawrence Livermore National Laboratories, also very heavily involved in this topic and are doing a lot of studies as well.

Finally, something that is coming this summer that could have a great affect on on-peak use and on water agency management in general is we understand that the utilities, PG & E, Southern California Edison, and San Diego Gas and Electric are going to be enacting a new rate design for all their water agency customers this summer that will essentially enact time of use rates and provide I understand some penalties for excessive energy use during high peak hours.

Between all those factors, we do see that there are some pretty good efforts out there to manage the energy in the ag sector, however, we are not sure that it is enough, especially because of this unprecedented shift in crop patterns.

As I mentioned before, 20 percent of ag pumps are diesel. It was just four percent in 1998, so there was a big shift there. We heard at that point that utilities were demanding quite a bit in charges when a farmer wanted to shift from a diesel to an electric, and it was discouraging a lot of that.

Now, of course, diesel fuel is about twice as high as it was five years ago at the wholesale level. We see a lot of farmers are starting to getting encouraged money-wise to switch back to electric pump motors. As I have mentioned, we have heard that utilities are pushing electrification. However, we haven't heard any plan for putting time of Time of Use meters for ag customers.

It all comes down to just from electrification the Irrigation Training and Research Center has an estimate of 863 GWh just from electrification of diesel pumps.

What is the net effect? We have seen over the years that actually the amount of water that the ag sector is using has gone down consistently from the Department of Water Resources Water Plan. We see those in their Bulletin 160 updates.

We think that pattern will continue, there will be more land idling, we will see people selling their water rights back to the urban sector. However, we just don't know if that is going to off set any increase that we will see from these changing crop patterns.

We also don't know if people are going to keep on pushing for drip irrigation. It is the number one conservation, water conservation effort in the ag sector. However, it does generally does increase energy demand. So, that we see is a very critical factor.

Finally, will electrification significantly increase ag sector energy and power demand, another big unknown.

That is what we hope to learn about a lot today, and I hope to learn a lot during the rest of my study.

With that, I am going to turn it over to our first speaker, which is Dan Howes. He is a Senior Engineer at the Irrigation Training and Research Center at Cal Poly University down in San Luis Obispo.

MR. HOWES: Thank you, Matt. I am pleased to be here today to talk with you about the energy requirements associated with the irrigation and water delivery and management.

First a little background on the Irrigation Training and Research Center. The ITRC was established at Cal Poly San Luis Obispo in

1989 as a Center of Excellence built on providing a history of contributions to the irrigation industry.

We currently have 25 employees, 12 full time staff, and the remainder are student employees. The center supports the irrigation teaching program at Cal Poly. The Center is also self-funded. We receive all of our funding through contracts from agencies throughout the western United States and world-wide.

In terms of training, research, and technical assistance, the ITRC works on water balances, automation and modernization of irrigation districts, training and technical assistance, fertigation, on-farm irrigation systems design, draining, and wastewater management.

From an energy standpoint, the ITRC provides training in technical assistance in variable frequency drive motors, training in pump testing, and pump applications. We recently administered the Water Agency portion of the successful California Energy Commission Peak Load Reduction Program. We have also quantified the ag energy requirements for California, also for the

California Energy Commission.

ITRC has completed numerous projects with farms and districts, including completing energy balances for irrigated farms, technical assistance and irrigation scheduling, and efficiency improvements.

The Irrigation Training and Research Center provides strategic and innovative thinking in every project we undertake. In accordance with the focus of today's workshop, I'd like to cover the following topics and provide some data that the ITRC has developed.

The first topic I would like to discuss is the current electricity requirements of the Ag Water Sector by sub sector.

The second is the effects of electricity demand caused by climatic changes, specifically drought.

I'd also like to address a few questions, one of which is how will California's energy requirements change in the future, and what water use efficiency or conservation methods will be implemented, and what could be their effects. Finally discuss what types of actions can be taken and some suggestions for energy conservation, water conservation, and peak load reduction.

First there will be a brief background on Ag Water Conveyance. Rain and snow are the basic building blocks. As precipitation moves into rivers and streams, is stored in lakes and reservoirs, and then diverted to water projects, into water districts, and finally on farms.

Each level contributes to recharge of the ground water in terms of the energy end users. Water projects, water districts, and of course farms are end users.

The first data I would like to present are the current ag water energy requirements for a typical year. The ITRC completed the California Ag Water Energy Study for the California Energy Commission December 2003.

This table shows the results of the study, splitting up the energy use by sub sector, which is irrigation surface water pumping, irrigation groundwater pumping, on-farm groundwater pumping, on-farm groundwater, on-farm booster pumping, and pumping for conveyance, and ag water to the irrigation districts.

You see that the total, our calculated total energy use is just over 10 million MWh per year. The key to this is most of this energy is used during the peak summer months from May through October. The bulk of that is even used between June and August.

We can see that on-farm pumping requires the most significant amount of energy, nearly two-thirds the total energy requirement.

The second table shows the estimated supply of the applied water, the calculated by the applied water. An interesting point to note is that on-farm groundwater pumping is the largest consumer of electricity, but only supplies approximately one period of the total applied water.

This is a map showing where in the state this electricity is used. The darker areas are the west and southern sections of the San Joaquin Valley. These are characterized by a significant amount of groundwater pumping as well as large canal lifts.

In terms of peak load. The average peak season load is estimated to be between 4,000 and 6,000 MW. the next logical question is how many farmers and districts operate completely off-peak, maybe 10 percent. Well, this is an area that is not well known right now, and needs to be researched.

The second topic I would like to discuss are the drought conditions, what are the energy requirements under drought conditions.

We conducted or are conducting a study for the California Energy Commission requested by Ricardo Ramone. I will be presenting some preliminary results from this supplemental study. We assume three levels of drought or surface water reduction showing years 1 and years 5 of a consecutive drought. We assume that crop acreage will remain unchanged, and any reduction in surface water deliveries will be made up through groundwater pumping, resulting in a groundwater level drop.

This table shows the results are the preliminary results. You can see we have a 20 percent reduction in surface water, a 40 percent reduction in surface water, and a 60 percent reduction in surface water.

If we look at the worst case scenario, a 60 percent reduction in surface water over a five year period, during year five, we see nearly two-fold increase in total energy requirements due primarily to groundwater level drought and that affecting the pumping levels as well as the pump planning efficiency.

The third topic is the Energy requirements for ag water in the future. Our predication is they will increase and here are some of the reason why.

An increase in permanent crop acreage or a ship from row crops to permanent crops require additional water, which requires additional pumping, as well an increase in drip/micro for irrigation which has an additional pressure requirement, also requiring additional pumping.

We will see an increase due to water bank withdrawals, water transfers to Southern California, decreased surface in water deliveries to ag for increased use in environmental and urbanization, as well as conversion from diesel motor-driven pumps to electric motor-driven pumps.

To quantify some of these, I'd like to look at a couple of examples. This first example is what will happen when the drip/micro spray acreage doubles. We have calculated that the increase will be nearly two million MWh per year.

This is almost a 19 to 20 percent

increase in the total electric water usage. Why? Additional pressure requirements require additional pumping. We have taken into account irrigation efficiency improvements associated with the drip/micro spray irrigation.

The second example that I would like to look at is fuel switching, switching from diesel back to electricity or vice versa. You can see that since 1970, certain events have taken place to cause a shift away from electric motor-driven pumps to diesel.

In 1988, the demand charge was introduced. In 2000, the energy crisis caused electric rates to soar. However, with the rise in petroleum costs, new stringent more stringent emissions requirements as well as the potential rate decrease for a conversion back to electric motor-driven pumps, we expect to see this trend reverse.

This table shows the results of what the energy requirement increase will be when the percent of electric motor-driven pumps returns to 1994 and 1988 levels. We expect to see a 1 and 1.5 million MWh per year increase respectively. This is for a typical year, during a drought condition, it would be much greater.

The fourth topic is Energy Conservation Programs. 2004 was the final year of the successful California Energy Commission Ag Peak Load Reduction Program. Irrigation Training and Research Center administered grants to the water agencies for this program. Grants were obtained by water agencies to reduce peak load as well as conserve energy through pump testing and repair.

Here are the results of the water agencies portion of the Ag Peak Load Reduction Program. Peak demand reduction is 43 MW, the annual conservation is over 21,000 MWh per year, with a total grant value of just over $5.5 million, with a minimum cost sharing of 35 percent by the water agencies.

The final topic for discussion is what actions can be taken? The ITRC has put together some short term recommendations as well as a road map for the future.

The short term, let's get the ball rolling, but first we must understand some constraints. Some examples of these constraints, some farmers are using groundwater instead of surface water with drip/micro spray irrigation because of inflexible deliveries from their water districts.

Other examples of districts and farmers cannot move to off-peak pumping because their surface water suppliers do not have the flexibility to take those changes in.

What is the solution. These constraints require innovative solutions. The ITRC suggests targeting the removal of these constraints in the conveyance and water district areas giving the farmers options to conserve electricity, water, as well as peak load reduction.

The Irrigation Training and Research Center has been instrumental in modernizing districts throughout the Western United States using technologies such as improved structures, addition of regulating reservoirs, SCADA, and automation.

The ITRC has also helped develop the technology roadmap for the California Energy Commission, the PIER Program, the Ag Energy Efficiency Program.

This roadmap sets research priorities in four broad tracks. Research in improved hardware used to pump, filter, and apply water. Reductions in on-farm and system gross water demands. Improvements in surface water conveyance and distribution. Finally, research in policies for energy and water usage.

In summary, ag water uses a significant amount of electricity in the summer and demands are likely to continue to increase.

In the short term, the ITRC recommends removing the constraints, providing conservation and peak load reduction options to end-users.

In the long term, the technology roadmap sets four research tracks in hardware, reductions in water demand, improve irrigation district deliver flexibility, and research in policies.

Any questions?

MR. KAH: Actually, it is more of observation than a question. You talked about the --

COMMISSIONER BOYD: Excuse me, for the purposes of our transcript, can you give us your name and association.

MR. KAH: Oh, I'm sorry.

COMMISSIONER BOYD: Thank you.

MR. KAH: Yes, my name is Gary Kah. My company is Aqua Metrics, and I used to be the PG &

E Pump Test Program Manager back in the early 80's.

You mentioned the whammy of reduced surface flow, and therefore, the increase in on-farm pumping. It is actually a tripe whammy in the sense that during drought, ETO is higher and the demand for irrigation water itself goes up, let alone the fact that there is not the same amount of surface water. The demand for water goes up on-farm. The other problem is that California has one of the highest hydro-generation percentages of any state in the United States, and the hydro availability goes down.

In terms of impact on our electric power system, it is a tripe whammy. You used one degree of freedom in the reduction of surface flow. It would be very interesting to explore the other two degrees of freedom in that.

MR. HOWES: I agree. There definitely is another whammy there. I also would like to point out that estimate includes a drop off in pumping farm efficiency due to groundwater level drops as well as the increase in total dynamic (indiscernible).

MR. HOUSE: This is Lon House. You have

that slide in there that estimates the energy use under different drought severities. Do you have an estimate of the increase in peak demand under those scenarios?

MR. HOWES: Yeah, I was told that a couple of times that someone would come up and ask me that question. I would expect -- I don't. I don't have a good estimate for that.

MR. HOUSE: I guess one of the points I wanted to make is, this is about a doubling in energy use, but it is not a doubling in peak use, right? Because what they are doing is they are using the same pumps, but they are just using them more often. Now, there will be an increase in peak use, but it is some percentage of that. You don't have an idea or an estimate of what percent increase in peak use would be associated with that?

MR. HOWES: Not at this time. Again, these are preliminary results, and the study is ongoing. You are right, we would expect it, because the KWh break or foot for each pump would drop off as the water level drops down, they are going to have to use the pumps even more often. If they were just using it during the day time, now they would have to use it during the night time, which is off peak.

If they were off peak, now they are going to have to go back to on peak pumping. So, we would see an increase in peak demand, but I would expect it not to be doubled.

MR. HOUSE: Thank you.

MR. KLEIN: Can I ask a question about the short term ideas you have?

MR. HOWES: Sure.

MR. KLEIN: Matt mentioned in his presentation that there is some trend in the utilities to change rates for ag, I'm thinking about time of use, peak or off peak, whatever it might be, one of the strategies occurs to me that you might want to -- we might want to be looking at the pump testing programs and pump efficiency programs simultaneously with the changes in rates, so that we are figuring out a way to get efficiency at the same time we are doing new electrification. What do you think about that? Is that part of what you are thinking about?

MR. TRASK: Actually, Gary, this is Matt Trask, what I said in my presentation that I am not aware of any shift to put ag customers on time of use, it was urban customers that I was talking about.

MR. KLEIN: That's fine.

MR. HOWES: Let me see if I understand the question. They would give rate reductions to people that have higher efficiency pumps, is that --

MR. KLEIN: No, not exactly. It seems to me that if we are going to change rates or we are going to talk about new electrification in the ag sector for whatever the reasons might be, whether it is policy driven or regulatory driven by some other agency, it doesn't really matter. It would occur to me that we ought to be doing efficiency programs simultaneously with the electrification programs, certainly for all the new conversions. But we also ought to be increasing our efforts from what you are telling us throughout the entire sector.

MR. HOWES: Yeah, that is a very good point. I would like to point out that the Ag Peak Load Reduction Program, the pump testing and the pump repairs did not go towards diesel and natural gas pumps. The rates or the amount of money that was received through grants and rebates was based on historical usage, therefore, if they converted last year from natural gas and diesel, they wouldn't be eligible for this type of grant program because they wouldn't have historical records.

Based on that, the grant programs may not be set up right now to take that into account, but it is definitely something that should be thought about.

MR. KLEIN: Thank you.

MR. SHAFFER: Quick question, Steve Shaffer, Department of Food and Agriculture. Again, back to the drought severity scenarios. Do those take into account land fallowing during times of drought, or is it assuming that consistent water demand across all years?

MR. HOWES: It is assuming consistent crop acreage and consistent irrigation system acreage. We are not assuming any change in different types of systems, such as moving to a drip/micro spray during drought conditions or land fallowing because we wanted to have direct comparisons to the baseline here.

We don't know what is going to happen, so we want to have kind of a worst case scenario in that case.

MR. KLEIN: I want to follow one more question if I may from Mr. Kah's questions earlier. Does the analysis you've done include increase of evaporation loses, or does it assume they didn't change during the drought?

MR. HOWES: It assumes they did not change because in my analysis, we completed a California Evaporation Study for Cal Fed and the Ag Research Institute. We looked at dry years, we looked at wet years, and a typical year. The increase in irrigation water, et of irrigation water did have some impact, but it wasn't a hugely significant impact, and I wouldn't change the values.

MR. TRASK: The Department of Water Resources has reached a similar conclusion.

MR. KLEIN: Thank you.

MR. TRASK: Next.

MS. TURNBULL: I am Jane Turnbull from the League of Women Voters. I would just like to ask some kind of question about equating gallons of water pumped to KWh out there. I think that some where along the line, that factor has to be brought into this, and I don't see that it is being done.

MR. HOWES: The acre feet in gallons are basically the same. There is just a volume of measurement. The slide I showed with -- if I can go back to it. The slide I showed here, we can see total energy use and total applied water in terms of ag water. This is only ag. Also, groundwater pumping supply, MWh per year, and acre feet per year. I think this is what you were trying --

MS. TURNBULL: Yeah, but we are so conscience of trying to improve the efficiency of energy use, and I know the water districts are trying to improve the efficiency of water use, I think the two have to be more closely linked.

MR. HOWES: I would agree, except some water conservation issues are going to require more energy, such as conversion to drip/micro spray irrigation from flood irrigation. You have increased pressure requirements, therefore, you are going to have increased energy demand.

What we think for long term research solutions would be to find lower pressure drip systems and micro spray systems to reduce that impact that the energy will have, but I agree, they need to be looked at as a whole.

COMMISSIONER BOYD: I think the question that I have is the technology roadmap and the roadmap for the future sets out certain research priorities that have been identified to continue to make improvements in this arena, and I think that is good and needed and needs to be encouraged, but actually in your preceding slide, you talked about getting the ball rolling and requiring innovative solutions. You pointed out that your center, the ITRC, has been instrumental in modernizing districts throughout the Western U.S. Are we continuing, are you continuing to do that even while we do or we launch the research which is going to take years to get results and feed them into the system. Do we have a consequently an interim progress going on here can continue to make improvements with what we know while we do the additional research?

MR. HOWES: That is exactly how I envision that slide to be taken. Yes, we have right now energy -- we have modernizing programs through the Bureau of Reclamation through the Department of Water Resources, as well as districts coming to us and saying, you know, we have a lot of farmers converting from flood and sprinkler irrigation to drip and micro, but we can't provide the water or the flexibility they need, so they are going strictly to ground water. We have to recharge that water, and we can't charge them any longer, so we are not making what we were making, so can you help us with that.

We go into a district with that in mind to provide the best service possible, to the point to where unless you have a closed pipeline, it can't be like your faucet where you turn it on and off, but you can order the water a day in advance, you can call up to have them shut off the water within twelve hours. These are all reasonable levels of service that we try to attain in these projects by using the technologies I have discussed.

So, right now, we are continuing that. We would like to have more ability to continue with that too, more grants for irrigation districts to help them out and some of the capital costs for these improvements.

MR. KAH: Just to follow up on this drought year, ETO and so forth, I am thinking of applied water requirements, and this is a study I did admittedly for urban areas during the last drought that we had which was '87 to '91, and by the third year of the drought, the applied water requirement for turk grass was at least 15 percent higher in 1990, but the applied water requirement for deep rooted plants, trees if you will, was edging towards 50 percent higher because of the lack of rain during the winter and the lack of the refueling of the root zone from the rain.

So, I would be glad to by e-mail or some other way, discuss the apparent discrepancy in our estimates of applied water requirement. The ETO may only be 5, 10 percent higher, but we are really talking about irrigation and water requirement.

MR. HOWES: Sure, I'd like to discuss that problem.

MR. KAH: That was Gary Kah again.

COMMISSIONER BOYD: Steve, did you get your question answered, or did I drive you away from the stand?

MR. SHAFFER: No, I'll reserve it for my comments as it relates to urbane (inaudible). Thank you.

COMMISSIONER BOYD: Very good. Thanks.

MR. TRASK: Thanks a lot there, Dan. I did have one question, but I think we will reserve that for the discussion panel after all the presentations this morning, and that is what are the factors that led you to conclude that you have 10.2 essentially GWh in the water sector while we are looking at about 2.3, so we will talk about that.

Our next presenter is Pete Canessa. He is with the Agriculture Pumping and Efficiency Program with the Center for Irrigation Technology at Fresno State.

MR. CANESSA: Thank you, Matt. My presentation today concerns our Agricultural Pumping Efficiency Program. There is a lot of resource management problems in the State of California.

Many of you in the room, especially are charged with making foundation decisions regarding regulations or legislation, but sooner or later, something has to happen out in the field, and this is one of those programs that tries to make something happen out in the field, so I will try to give you an appreciation for how we get it done in the field.

Along those lines, there were some hand outs out in the lobby. One of them, this one here, it has a cover of our web sheet on it. There is a couple of papers that I gave a couple of years back, the last one dealt with some of the actual decisions we had to make with the AG Peak Load Reduction Program in getting that out in the field, so it might make some interesting reading for people that get a little far away from the stuff we have to do with the individual farmers.

It is very important how these regulations how they get drafted. I mean the language itself is so important. Anyway, there is that.

I changed up the slide show a little bit, and there is a single page out there that the first eight slides especially are little bit different, but I think you will be able to follow along okay.

The topic today, The Agricultural Pumping Efficiency Program Multi-Purpose Resource Management Program for California. My name is Pete Canessa, I'm the Program Manager at the Center for Irrigation Technology for these programs. My main expertise is in water. I've got a masters in irrigation and drainage. I've been in the business 30 years. I've taught upon PG & E at Poly and Fresno State, but I was consulted with PG & E and their energy efficiency program for 10 years, and for the last five years, I've been running these energy efficiency programs. So, I've been on both sides of the equation.

For those of you that are not familiar with the Center for Irrigation Technology, we are much like ITRC, but only on the campus of Cal State Fresno. We have a hydraulics lab where we do a lot of testing of commercial products. We verify that the specifications that are published are true. We do a lot of applied research. We are doing a lot of work right now with the Commissions on dairy lagoon ponds. A lot of analytic studies, special projects, we call the Ag Pumping Efficiency Program a special project.

Many of us within the center are teaching on an on and off again basis. As I said, we are part of the College of Agricultural Sciences and Technology on the campus of Fresno.

Three topics for today. I want to talk about a couple of concepts that under lay the design of our program. In the last five years, I've managed probably $20 million worth of energy efficiency funds going out in the field, and we like to tell people, look, we are not just a group of guys writing checks. There is some method to our madness out there, so we will talk about a couple of these concepts.

Then we will go into the specifics, what is the Ag Pumping Efficiency Program, it is on going, it looks like it is going to be going through 2008. It is the major effort for on-farm energy efficiency right now.

Then the last subject, I think, will be pretty interesting for you, especially we were talking about the electrification of some of these diesel plants out there. Is how a program like ours can help to avoid redirect impacts.

Redirected impacts are a pretty buzz term that is very important in the Cal Fed process. I think you will see how programs like ours are important to avoid them.

The concept to underline the design of our program, I want to talk about one, which is kind of the philosophical basis, is the idea that ag energy use if you want to perceive that as a problem, that is a fact that we can reduce it, we call it a non point source type of problem.

Non point source, you probably hear the term more often with water quality issues, but it is a type of problem. Then I want to show the analytical basis for our program design, and I think I can form the linkage that the League of Women Voters was looking for with that topic.

Ag energy use as a non point source type of problem, and when I gave the initial paper on this, one of the first questions was, why should we worry about the type of problem.

The reason is as I said, there is some very important resource management problems in California right now, energy and water, which we are talking about today, but air quality obviously. The other problem there is this state is short of resources. I think we all understand the budget problems and the fact that we are mortgaged up to the hilt out there.

What you want to do is attack these problems as intelligently as possible and get the most bang for your buck. So, you want to understand the type of problem you are dealing with. I'm not going to go into the basics of non point. I think we all know what some of the characteristics are.

Does ag energy use fall under this type of problem? Is it diffused? You have to diffuse. There are 86,000 pumping accounts in PG & E alone, somewhere in that range. Are all these operating legally? Yes. I mean as long as emissions are controlled and that kind of thing like that, and he is not flooding his neighbor, all of these are operating legally. Is any one of these pumps causing problems, no. If you look at energy use and agriculture as a problem that can be solved in terms of reducing energy use, reducing the peak load, it is the cumulative. That is the definition of a non point source problem.

That is what we are dealing with. There have been a lot of statistics out about the energy use of agriculture sector in California, and the numbers I had from '97 in PG & E were something like 3 billion KWh, it was 80 percent of the total for the ag sector defined as an ag account within PG & E rate structure.

Right now, our pump efficiency test data base is showing about an overall 52 or 53 percent overall pumping efficiency with all pumps, except immersibles. You get that up by two or three percent, you are talking about 90 million KWh per year.

We are talking about a very small incremental change, but we are talking about that incremental change on 86,000 pumps. That is a non point problem.

Some other more important characteristic non point, which drive our program design and should drive some of your decisions, non point source problems are very slow to evolve. They are generally not catastrophic. They become predictable. You start to see this problem, and then everybody starts to study it, and you say if we don't do anything about this, in five years we've got a real problem. All of the sudden you realize you have got to start to address this.

Because these problems are slow to evolve, the activities that are causing the problem are entrenched. What I mean by that is there are very large investments in hardware out there. There are investments in management training and expertise. There is an infrastructure built up around the activity. Cultural environments are established about the activity, and you get certain benefit cost structures established.

These problems that are very entrenched, took a very long time for them to appear, they are not going to go away over night. Non point source problems require very sustained, very steady programmatic approach.

Very complex. All of these characteristics that we are talking about that make them very complex and difficult to fix, some of the issues, number one, difficulty in verifying that progress in being made. You know, five years from now, maybe I show my pump test data base shows 51 percent. Somebody does an analysis of a pump efficiency test in the field, that is within the range of area. Sometimes it is difficult in verifying that progress is being made. Anybody that has dealt with water quality issues knows this.

Is the political will and the funding available for the long term? I say the state is in real problem right now. It may be easier to just go build another power plant, it depends on what the politics of the situation are.

Then with non point source problems, you want to talk about working with both the supply side of the activity and the demand side. Dan Howes was talking about the research track. Those are kind of on the supply side, the PIER Program, that is on the supply side. You are talking about the hardware and the design techniques and the (indiscernible) techniques that are available to the people that are out in the field.

I am not going to talk about the supply factor. My program is on the demand side, but the supply is important. I just came out of a meeting with the PUC yesterday, you know, they are going into planning for the 2006/2008 funding cycle. They know we've got a real problem with energy use in the state all over. A lot of their activities in terms of energy efficiency money are going to start shifting to what we call up stream activities.

An example of this would be high efficiency motors. Instead of paying people or giving people rebates to put in an high efficiency motor in the field, you are going to start giving money to the manufacturers and distributors, making it easier for them to stock these motors and push them. You go up stream with them and get more bang for your buck.

On the demand side, which is what I have to work on, what we realize with non point problems are that they are substantially the result of activities by people. So, if I am going to fix these, I've got to change the way people act, the way they think and act about both the hardware that they choose and how they manage it.

When I am trying to develop a program that is going to direct a non point problem, I am looking at three things. I've to establish problem awareness out there. I've got to make this man understand that he has got a problem, that there is a problem, and that it is his problem. If a guys says, yeah, I know there is a problem with energy in the state, but it is not my problem, he is not going to do anything. So, I've got to get this guy to own the problem.

Then I've got to get some solution awareness out there. I've got to make it clear that hey, there's something you can do about it. A manager may say, yeah, I know there is a problem out there, but I don't see anything I can do about it. Nothing is going to happen, so I've got to make him aware that solutions are available.

Then finally, give him a situation, I've got to have some targeted resources. Because even if he says, yeah, I've got a problem, I know it is my problem, I know there is something that can do done about it, I just don't have the time or money to do it. Sometimes I've got to give them some resources.

As I said, not to confuse the issue too much, these resources don't have to be money. Expertise, engineering expertise. During the deregulation phase, CPUC was looking for ways to attack energy efficiency, they started using the term "market transformation" instead of buying the resource. They wanted to transform the market. They were talking about this problem with solution awareness.

Let me talk about market barriers, and they said well look, if I've got some energy efficient equipment out there and the guy is not using it, why not? One of the problems was (indiscernible) information, the fact that he didn't trust the information regarding that problem. Sometimes these targeted resources is a trusted information source and get that information out there, so that he trusts us.

I know I have to get this problem solution and resources out there. These components exist at both the implementation side and on the design side. If I am a designer, if I am talking about problem awareness, number one, the first thing I've got to do is identify the right problem.

The example I always use about this is water quality in the Salinas Valley. We did a lot of work with Monterey County Water Resource League in the early mid 90's. During that phase, the concept of that problem was that the bad farmers in the South Valley were using the water before it could get up to the North Valley. Therefore, the sea water was intruding.

That was a pervasive set up of three or four years. It got around to the fact that it had three or four hydro-geologic models going around there. Nobody could agree. The water manager locked them in a room one week, and said you guys aren't coming out unless you've got one answer. Lo and behold, the South Valley Conference (indiscernible). They spent three or four years attacking the wrong problem.

As a program designer, regulations,

legislation, make sure you are attacking the right problem. Make sure you are addressing hardware and management. We talk about drip irrigation as a means of saving water up here. Some of the worst irrigation systems I've ever evaluated or seen were drip irrigation systems. They either weren't designed correctly, they weren't maintained correctly, but get this straight. If a guy runs a drip irrigation system twice as long as it has to, it is still on 50 percent efficient. The hardware is only as good as the management.

Solution. When we talk about solutions, I've got to find solutions that are economical, widely adaptable. They've got to be complete. I am talking hardware and management again. Then they can't cause redirected impacts. We will talk about this at the end of the presentation.

Then the resource again, engineering services, low interest loans, out right grants, a trusted information source.

That was kind of a philosophical base behind the design of our program. The analytical basis and I think this is the question the League of Women Voters were asking, what is the actual connection between energy and water. The connection is in the equation. A very simple -- it is a conceptual equation for irrigated agriculture, the KWh used for year the energy is equal to the KWh need to pump an acre foot through times the acre (indiscernible) pump through the system.

I can break this down further, the KWh hour need to pump an acre foot through our system, dependent upon the total dynamic head, the pressure on the system, and the overall pumping efficiency. That is the hardware side. That is why we are attacking what we call rotating machinery or the design of the system.

Here acre foot per year or gallons, I mean this all in the water. That is the long equation. I'm not going to go into it, but right there, irrigation efficiency, that is the managing side, that is the water. That is the analytical basis, that is how we attack it out there. We have always seen this energy and water connection, and that is the direct connection.

That is why we need you to look at a redirected impact. I'll use this equation again at the end. I'm going to use APEP because it is too long to say, APEP specifically multi-purpose resource management program, primarily designed for energy conservation, but because of the basis as we understand this language, it is also water management, water conservation, and we are going to be expanded into diesel power company plants probably by the end of the summer, air quality at the same time. We can attack all of these resource management problems.

How does it work, how it is funded comes through what is called the public goods charge under the auspices of Public Utilities Commissions. If you look at your energy bill at home, you will see a bunch of line items, (inaudible), public purpose funding, base for the (indiscernible) power campaign, all the energy star flag stuff. PG & E is our contract administrator on behalf of the Public Utilities Commission. I talked to PG & E, they talk to the Commission.

CSU, one of our Fresno foundations, one of our non-profits that supports the campus, is the actually contracting entity. They take care of the accounting, and we don't. They've got audited books, that kind of things.

Center for Irrigation Technology, we do

design and actual field implementation. We've been operating in all four investor owned utility areas, San Diego Gas and Electric, Southern Cal Gas, PG & E, and Southern Cal Edison. We do not work in say, Sacramento Municipal, Modesto, Turlock because they don't pay the goods charge.

Total funding. Our first award in this particular program was a June 2002 about $9 million since then. Objectives. Get efficient pumping plants in the field and make sure they are managed correctly, both the energy and the water side of it. The target audience currently is ag and large turk irrigation. Probably within a week or two, we will move into municipal pumps. Anybody in here from the municipal water district, you want to pay attention to our website because some money available to you guys pretty quick.

What do we offer. The subsidized pump efficiency tests. We are providing objective information out there to the individual pumpers. We have incentive rebate available for those that decide they want to retrofit a pump. We generally covering 25 to 30 percent of a project.

Technical assistance, no site-specific engineering, and our education. It is a very simple four point education message. We stay on that all the time: Know how to install the pump, know how to maintain the pump know how much water needs to be pumped, that is your irrigation systems, that is your water management, and know how much water has been pumped. (Indiscernible) flow meters out there.

Dan was talking about the ag water management committees and the BMP list. Number one and number two on anybody's BMP list for water management is measure.

Program design. Like I said, standard for non point source, we do a program on solution awareness with our education information. We have targeted resources.

Now this idea of education information. This is a huge debate in the Public Utilities Commission right now. How do you value a program that does nothing but education information and doesn't buy the resource. How much money are you going to spend on programs like this? Be aware that when we talk about education information, mass or targeted marketing. I like to tell people, I am in a retail business. My product is money. My profit is energy and water conservation in the State of California. But as a retail business, I can't push my product unless people know about it.

I can (indiscernible) half the guys in the room don't know how to do it. If they don't know I exist, they are not going to take advantage of my program.

Individual outreach, we do a lot of work through (indiscernible). We don't hire. We don't have any pump training. I have 40 to 43 commercial pump testers that have agreements in place. They do my pump testing, they do my marketing for me. I'm going out to the pump repair company. I am going to use their profit incentive to push the message.

The pump efficiency tests, specific information, it is called an energy audit in the Public Utilities Commission and we do field seminars.

What have we done to date? Within this particular program, 5,300 pump tests, put a million in pump test subsidies out there. I've still got $300,000 left. 339 pump retrofits, and I've still got $800,000 left for that. 75 educational seminars statewide.

We also implemented the AG Peak Load Reduction Program for farmers, did another 8,700 pump tests with that. You know another 438 pump repairs, and we also got about 9.3 MWhs of peak load under that program.

(Indiscernible) educational centers. These are self-contained pumping plants. Our generator there in the green, that is a generator. I've got a water supply here. We run a pump test (indiscernible), we will pull up in there. We have done educational seminars from San Diego to Klamath Basin.

We are putting together a new lab, multi-purpose lab, water, solar, and power is helping us there. We are big partners in the industry in Fresno.

Redirected impacts. This is the last thing I want to say about this because this is very important. Resources (indiscernible) you cannot fix something over here and screw up something over there.

I will give you a couple of examples and why a program like ours is very important to avoid this. To flood to drip, this is one of the big topics. Because of the water problems in this state, the farmers (indiscernible) for better irrigation systems. What this means to energy, again, there is that equation. Drip irrigation is going to lower that number right there, what is this going to do to energy use.

Maybe water conservation is a priority problem, so I've got to go this way. The least you can do is minimize these impacts. If there are groups out there like ours that number one, making sure that the pumps are going to be efficient. One of the real problems is the guy that put in a new irrigation system and then uses his well pump to pressure. It takes that pump completely off its condition. You need people out like us that can understand both sides of this problem and talk to the folks on both sides of the problem at the same time.

Last, redirected impact. We are talking about electrification. What we are talking about PG & E and Southern California Edison proposed a tariff to the Public Utilities Commission are the decisions going to be made around June 20 that will subsidize the conversion of diesel powered to electric. That will subsidize some line connections, takes away some of the demand charges, and it is a subsidized rate.

The purpose obviously is to improve air quality. That is laudable. Anyone that lives in the San Joaquin Valley knows that situation, so you would like to help it out. Redirecting impact, what is going to happen to air quality in main generating plants. Impacted grid and overall energy supply/demand. With the price of diesel going to $2.80 (indiscernible), believe me this tariff gets fat, you are going to see 1,000/2,000 pumps get reversed. These are big pumps. They are generally primary water supply that are operated 24 hours a day.

Since they are diesel, they probably haven't been looked at in a while, the pump itself. This is a serious situation, and then you've got a political act, well, who is going to subsidize this tariff.

The least you can do is get a group like ours out there, number one, testing diesel power pumps seeing what you are doing, but also, if you got to connect these two to grid just to make sure they are at least as efficient (indiscernible).

Don't go fixing air quality and screw up the energy water thing on the other side.

To summarize it all, Ag Pumping Efficiency Program, we have addressed multiple resource measures, programs. One program primarily energy, but we obviously do water because they are tied together completely. We are going to get into air quality. The advantages of a program like ours, number one, we leverage available resources. In an ideal world, I've got some of my admin over here taking care of by the Public Utilities Commission, some by the CEC, some by the EPA, and some by Bureau of Reclamation addressing problems. They are all interested in. I've reduced confusion in the field because I've only got one program for the farmer instead three, four, five.

Trusted information source, non profit public service, VSU campus. We helped to minimize these redirected impacts, our funding is (indiscernible). Right now I can't spend any money. I get some EPA money, now I am authorized to spend money. Under the Ag Peak Load Production Program, I couldn't spend any money (indiscernible). In my program I can spend money on natural gas. It depends on the authorization of this funding.

We understand the type of program we are dealing with. Like I said, we are not out there just writing checks. If you are interested, our website www.pumpefficiency.org has got full information. That last slide has got the numbers.

COMMISSIONER BOYD: Thank you for your --

MR. TRASK: We are getting some noise from somebody on the tele-conference.

COMMISSIONER BOYD: Thanks for your presentation. You mentioned that you are only working with the investor-owned utilities because they are the only ones that pay public goods charge. Have you approached and then turned back by any muni's? They have the capability to raise funds through their own public goods charge if they choose to do so. Have any of them entertained that thought with you, or have you been spurned in all efforts?

MR. CANESSA: We have talked to a couple of them. Mark talked to Modesto, you know, we know all of the people on the water side. They are running some programs on their own. We think, especially with our moving the municipals, we will be talking to LAWT especially.

If you look at Imperial is a very large self-generating utility. Most of their ag is gravity fed down there, that is one of the reasons why we haven't approached them before. What you would like to do, I think, and the Public Utilities Commission is moving this way, is that you would like to have a very unified approach to these programs. A lot of growers are running lands in two or three different districts for two different utilities, and you would like to see a unified, consistent approach.

COMMISSIONER BOYD: I would agree with you. I am impressed with your program. I have heard of it, but I have never heard it described in this depth before. Consistency would be important, so when you are dealing with the likes of Turlock or Modesto, it would be good to have the Valley treated fairly consistently, and I think your point about a unified message that touches many fronts and deals with, as I like to call them, the unintended consequences. You have a new term for me, but I think it is very good. So, I'm impressed with what it is you are trying to do. It is good work.

MR. KAH: Yeah, Gary Kah. I wanted to

thank Pete. That is an excellent presentation about a great program. I wanted to bring in the issue of well efficiency to your analysis. The gold standard for well efficiency would probably be a public water supply well, 24 inches in diameter, very well engineered, very high quality installation process versus many ag wells, especially ones that are only used in drought years being an impact driven, in other words, poke a hole in the ground, and they don't do much with screens and gravel pack and so forth.

Well efficiency deals with how much draw down is created from going at zero gallons per minute to the rated capacity of the pump. That adds total dynamic head, and it is an important component, and I don't know if the solution there is some kind of we have miles per gallon standards for vehicles. Well, maybe in terms of well design and installation, there should be some idea that you can't just -- no, I must say, the demand factor on some of these wells, the ones that come on during droughts especially, is what, five to ten percent over a ten year period? It is very low for some of these pumps.

More main line pump might be used every

year, but there is sort of a hugo philosophy. Why build a gold plated well and even a pump for something you are only going to use every fifth year during a drought. So, there is the issue of the statewide interest in energy efficiency versus the individual growers interest in getting a functioning well that he is going to only use once every five years.

I would ask that you bring in the well efficiency to help people understand that part of it.

MR. CANESSA: That's right, and one of the ways we will do a rebate. There is a couple of three different things we will rebate on. One of them will be what we call a well rehabilitation. You know, we will require a before and after test because we are dealing with draw down, and they have to be fairly quick so we've got apples to apples, but we will rebate on a well rehab. You know, swab and something like that.

It is a very good point on the well design. One of the things that you touched on just very briefly, you have to understand the economics of some of this stuff. We were talking about a non point source solution and establish that for cost ratio. If I am talking to a lettuce grower in the Salinas Valley or something like that, this guy's got a crop that is probably worth $3,000 or $4,000. He has $3,000 or $4,000 per acre in that crop in the ground. He hits the market, it might be worth $10,000 net profit per acre in the ground. I am trying to get him to worry about $50 worth of energy or water.

You know, that is the kind of row we have to hoe. That is what I am saying, it is a tough deal. Good point, though.

MR. MCLAUGHLIN: Bruce McLaughlin, California Municipal Utilities Association just for the record. Commissioner Boyd, I'd like to express interest in the program, and CMUA can act as a conduit for information.

MR. CANESSA: We will get in touch before we are done.

COMMISSIONER BOYD: Thank you, that is a good point. That means we might not have to use our leverage in power plant sitings for irrigation districts to stimulate some of this if we get the CMUA to do it for us.

MR. TRASK: I'm glad you said that, not

me. Go ahead, Mike.

MR. SMITH: One quick question, Mr. Canessa. You list off a number of agencies that provide funding support. I didn't hear you mention the air districts. What has been your experience in working with the air districts in obtaining funding support, for example, in clean fuels for ag pumps that reduce Nox emissions?

MR. CANESSA: We've been part -- there was two groups that I have been part of for the least six to eight months. One is called Clean Air Clean Energy Group. It was as a result of a presidential directive, this multi agency. They have no funding, so it is basically been a discussion group trying to flesh out where ideas are, trying to incubate them and find funding sources for them.

The other one, though, is what is called the West Coast Collaborative, and it is an EPA-driven thing. We just got a big -- they would be our potential funding for this summer. We'll get some money off them.

We have been in discussion with the Regional Air Quality District. Their main effort is in the Moyer Program in terms of ag. The Carl

Moyer Program will subsidize replacement of old or diesel engines with new diesel engines.

There is an up coming conference where one of the subject matters is how can we extend the eligibility of Carl Moyer funding. When it first started, they would not fund electrication. They modified that and so they will fund a guy going from a diesel to an electric motor, and that ties into this proposed tariff.

They are not talking about going to the pump itself. What we've tried to make a point on our concept in the diesel is that you have to look at the pumping plant as a system, not the power source, transmission, and the pump itself. Carl Moyer looks at the power source. That is good if the facet fits, but if you slap a new engine on a 20 percent (indiscernible), it is going to operate twice as long as it has to.

What we are saying is yeah, the Moyer Program is good, but let's made sure we address all the issues. I think they are aware of this, and they are (indiscernible).

COMMISSIONER BOYD: This is a little bit of serendipity, but earlier this week, I found myself in Washington D.C. running into representatives of the West Coast Collaborative and mainly EPA Region 9 A and 10 and the Air Board and the San Joaquin Valley Air District, and we all sat down and had dinner and talked about the need to interface more of this together. Yours was an element I had not thought of, and I think we should work to plug you more into that and plug this system together. So, I think there is some potential here. That is a good point.

MR. TRASK: Pete, I just had one quick question. I've been very impressed with the efficiency of the new motors that are out on the markets these days. I have heard of payback periods in as little as a year. I am just wondering what you are finding on your tests on the range of payback periods for pump replacements or motor replacements?

MR. CANESSA: On a motor side, I would have to look at those numbers. What you want to realize, motors -- again, this is a very good example of what happens on the supply side. About '91 or '92 or something, there was regulation passed awards from the governor how motors could be manufactured. After a certain time period, efficiency motors, new motors are very good out there. There is something called a premium high efficiency motor.

Basically, let's say you take a 50 (indiscernible) motor, it might be a 92 percent efficient, a premium high efficiency might be a 94/95. You are only talking three points. Unless that motor is running a whole lot of hours, and there are pretty good cost differentials there.

Premium high efficiency motors generally don't make sense unless it is a buy, a new buy situation. On a retrofit, very rarely is it going to pay for itself. Depending on the guy's requirements and depending on the subsidy that is involved. They are out there. What you run into, though, say in an ag environment where it makes sense is we will see these pumps, you know, it gets tested at 30 percent, we rebate on a pump repair. He gets it retested, and it still is only at 55 percent.

He starts getting that pump repair coming, come to find out the motor is 40 years and been rewound five times. So, the motor itself is probably at 82 percent. At that stage of the game, yeah, we are going to replace the motor too.

The utilities all have up stream

programs for premium high efficiency. Like I said, they want to move that way compact lights. They want to get up stream with the lights, so they get more bang for their money.

MR. TRASK: Thanks very much, Pete. Our next speaker was at the mike a little bit okay. That is Steve Shaffer. He is the Executive Director of the California Department of Food and Agriculture.

MR. SHAFFER: Thanks, Matt, and thank you Commissioner Boyd and, again, I'll compliment you on your leadership and the Commission's leadership for bringing and identifying this linkage and starting to shed light on it.

For the record, Steve Shaffer with the Department of Food and Agriculture. My title is Director of Agricultural and Environmental Stewardship.

My presentation if you can call it that is maybe a bit of a stream of consciousness here and bring it back up to sort of the 30,000 foot level. I'll try to keep it organized as I draft some notes, and I apologize that I didn't have a little more time to put into this.

Matt did a very good job, I think of

identifying the status and place of agriculture in energy and water and identifying some of the trends. I would reiterate again this is some older information, but probably generally holds true that agriculture represents about five percent of the energy demand for the state.

Water pumping is about 25 percent of that demand is embodied in electricity for irrigation. That again equates back to approximately that one percent that you referenced, though some of these trends, and again, this is older information, so some of these trends that have been identified in terms of shifting from furrow to micro sprinkler and drip systems, there is of course a lot more embodied energy in that.

There is approximately, and it is that black hole of perhaps a million acre feet of groundwater depletion that translates into increased energy demands, so that one percent is certainly a ball park figure and was interesting to see some of the ITRC analysis.

Again, Matt identified some of the trends in terms of moving towards higher value crops, permanent crops. There is still large irrigated acreage in the irrigated pasture, alfalfa, cotton, rice, those probably embody still three million acres out of the eight million acres or so that are irrigated in the state. So, it is still quite significant demands there.

Some of the other trends, you know, we still are seeing a lot of urban conversion of our best agricultural land on the valley floors and the shifting because of this technology of ability to irrigate precisely vineyard in particular on the hillier ground, so those trends also would lead to of course increased energy demand to irrigate those crops.

I know there are some that are actual dry land farmed up in the foothills. I think to tease that out a little more would be of great value.

Matt also identified water transfers as at this point, one of the and perhaps a significant strategy to meet water demands across the state until more infrastructure water storage and conveyance infrastructure comes into place, if it in fact it ever does.

A couple of other demand or trends to perhaps keep in mind, I think the trend towards the higher value crops will continue, especially as the public demands for dietary reasons, health and nutrition reasons. More fresh fruits and vegetables, and because of the food safety issues that are being raised from more local sources. Also just as global energy continue, it will be interesting to see how long we can continue to haul water embodied into some of these fresh crops from Chili, from China, from other remote sources. The market and the public will help make that decision in terms of willingness to pay as perhaps that embodied energy is also included in those costs.

I didn't hear much on regional shifts. For example, I saw Martha, and I am blanking out on your last name, Martha.

MS. DAVIS: Davis.

MR. SHAFFER: Davis, thank you, from Inland Empire, but this shift of the dairy industry from Chino Basin up into the San Joaquin Valley and what that might mean in terms of regional energy demand implications. That might be something else to consider and have some analysis on.

A couple of observations.

Unfortunately, I won't be able to stick around for the urban session in the afternoon as much as I would like to. There has been a lot of discourse, especially recently in the press because of the recent renewals of the CVP water contracts in terms of the cost of this water versus the cost of water at the urban side.

I think it is important to point that out that a lot of that cost differential is embodied energy. I hope part of the urban discussion, it looks like that will be, so we will really highlight that as some of the discussions already this morning point out, farmers can't turn on a tap on demand and turn that tap off on demand.

Though, the trend is almost moving towards that way in terms of these pressurized systems and what have you, but much of agriculture as again was mentioned, Imperial Irrigation District, some of the east side irrigation districts, these are gravity-fed systems. There isn't a lot of embodied energy in those systems. I think that really needs to be highlighted in terms of the price of the actual water versus the price embodied and what is delivered to the customer.

I also haven't heard much in terms of the energy embodied and actually moving water through the state and federal systems. We have heard a lot of the on-farm energy use, but defining that system boundary. Is it from Lake Shasta down to that field on the west side. So, I think a little more discussion in terms of the overall system will shed some additional useful information.

I want to emphasize some of Pete's -- one of Pete's fundamental messages in terms of near term activities in terms of education and technical assistance. I think that is going to be the key in the near term in terms of improving energy efficiency relative to irrigation practices.

That system analysis, I think this is one of these over arching themes of the day or at least the morning is the system analysis whether it is a well and pump system or whether it is a basin and looking at a hydrologic basin and they want the water efficiency of that basin and the nexus to energy, it gets to some of the redirected impacts that Pete was talking about is extremely important.

I know Mark Roberson is well versed and Ray Hart, I don't see (indiscernible) here who brought a lot of that to the four originally, but if we are looking at these efficient irrigation systems of drip and sprinkler, those have basin efficiency implications in terms of the reuse of some of that water that may have come out of furrow systems for downstream irrigators, for managed wetlands. If there is a change in the hydrology of that basin due to these systems, the sprinkler and drip systems in terms of groundwater recharge, in terms of surface reuse, what are the linkages and trade offs environmentally from a water, a habitat standpoint versus an energy standpoint.

Just a couple of other things looking farther out ahead. I heard one reference to it, but there is a huge opportunity, I think we all would acknowledge that in the room in terms of distributed generation to meet a lot of these energy needs for irrigation in the future.

Looking at photovoltaics, looking at bio gas, bio diesel, ethanol for internal combustion engines, looking at fuel cells. As I discussed the Carl Moyer program and this whole trend towards shifting away from diesel to cleaner diesel, what is that really going to buy the agriculture industry if in another five years, there is additional air quality regulations where these diesel engines have a lifetime of 20 years and perhaps more.

Is there an opportunity to leap frog technology into fuel cells for example. So, I think we need to keep those sorts of longer term strategies in mind.

Our secretary A G Kowamura has said as an unofficial goal if you will, that agricultural become energy self sufficient. Didn't pass and set a time frame, but just has put that out there as a goal.

I tell him that is an extremely laudable goal. I think agriculture can do even better than that and be a net producer of energy to the benefit of California as a source of renewable energy.

So with that, I'll put out one more concept for you. We've done some back of the envelope calculations, very rough, just in terms of the resources and energy and system balances, not withstanding any of the institutional barriers that certainly are a part of this.

The concept is transferring electrons rather than water. For example, there is a nascent sugar cane industry developing in the Imperial Valley, and they are looking at sugar cane much as Brazil does for both electricity and liquid fuels production. Again, we did the back of the envelope calculation that there could be a new industry in that region that could provide all the electricity needed for San Diego to desell the amount of water embodied in the Imperial San Diego water transfer.

The fuel ethanol would also be available for market, and there would still be insteading of land fallowing or land retirement to conserve that water. Not that much, but still an amount of drainage water going to the salt and sea.

That is an interesting concept. Is it feasible. Again, from a resources balance and systems analysis, it is interesting to look at. It seems on the surface to have some benefit. Whether in fact it is truly feasible, a whole lot more work would have to be done.

A similar concept might be looked at in

terms of the San Joaquin/Sacramento Valley and how much water and how much energy is embodied in shipping that water over the Tehachapis to Southern California. Again, can there be some systems developed to keep that water that economic activity developing a source of renewable energy that ships electrons south and makes Southern California perhaps more regional independent, regionally self sufficient in terms of water and the state more independent in terms of energy. It is an interesting concept I will leave you with that.

I am happy to entertain any questions.

COMMISSIONER BOYD: Thank you, Steve, for being here. We really appreciate the fact that you are here. You and your department bring a lot of resources to the table that I want to make sure are incorporated into the work that we are doing and that we capitalize on your agency's presentation. I think people can see as a result of what you said today the fairly broad view that your agency takes on this issue and understands the system's connection let's call them of what agriculture means.

We did have another workshop on this

subject some time ago, and we did just so you know this fact, we did talk more in that workshop about the gross movement of water throughout the state by facilities like the state water project and what have you.

Your point is a good one and luckily we recognized it fairly early on. Your point about distributed generation is very well taken by me, as you know, and is part of the systems look we need to take, and hopefully in the context of this workshop, but certainly in the context of workshops we will have on bio energy and the work of the newly being formed bio energy working group, I hope we can introduce some of these thoughts into this Integrated Energy Policy Report process.

As you know, we have met and talked with your boss on more than one occasion about the desire for agriculture to be self sufficient energy wise, which I think is an admiral goal, it ranks up there with the hydrogen highway somewhere I believe.

We can build the bridge to both of those. In any event, there is a lot of potential in the ag community for the development of energy in various forms, and I think it is something we need to take into account as we look at how we generate electrons or liquid fuels or other types of fuels to move things around and how agriculture powers itself so to speak.

Anyway, I hope we do capitalize on what your department brings here and involve some of your staff at least on almost a full time basis in this effort because it is going to take great minds all over the place to deal with this.

Your systems and you and looking at the big picture really strikes a card with me, but as old troopers like you and I know, historically, we really have a tough time thinking that way, so we are going to have to work real hard on it. Anyway, thanks Steve for being here. You have a question?

MR. KAH: Yes, Gary Kah again. You mentioned the five percent of total energy use thing. I used to do this, and I have the same problem when I was at PG & E trying to sell my ag energy program to the managers, but they really perked up quite a bit when at least in my day, this is 20 years ago, ag was well into double digits of the peak load. That gets people's attention, and when we had our Enron -- excuse me, energy crisis of two years ago, three years ago, it was a peaking problem that caused the brown outs and all of the associated problems and attention that got.

Yeah, it is not that much energy, but it certainly is a big percentage of the peak to the extent that all these trends are in place, it is going to be a bigger potential problem I think.

MR. SHAFFER: Absolutely, and one of the major concerns of agriculture is that reliability, that systems reliability. If there are rolling black outs, that has huge implications in terms of not only crop irrigation, but more in particular food processing. Shutting down a milk processing or cheese processing for an hour really means shutting it down for three days. So, that is extremely important. That is why again some of these what I might characterize as longer term opportunities truly could be shorter term opportunities in terms of some of these distributed generation approaches.

COMMISSIONER BOYD: Jane?

MS. TURNBULL: Thank you. Jane Turnbull again. I'd like to pick up on the distributed generation as well. The five leagues in Santa Clara County recently conducted a study of water reliability in the county and we were particularly concerned about disaster preparedness. Actually 50 percent of our water does come from groundwater. We are concerned about the vulnerability of water coming from the Delta and the conveyance from the Delta, but we are also concerned about the availability of water from the wells.

If there is an earthquake, we would assume that we would be without power for a long period of time. We would be unable to pump the groundwater, so the concept of distributed generation at that level would be particularly attractive.

MR. SHAFFER: Just one other comment on the conveyance systems. There are linkages between conveyance systems, water quality, and then what that means in terms of treatment disposal, all of those sorts of things. Again, I could really touch on a hot button thing in terms of conveyance, but I won't at this point.

Thank you.

COMMISSIONER BOYD: Thank you, Steve.

While we are getting ready for our next speaker. Could I address this listening audience out there in telephone/radio land. We have to ask you to be careful of the noise you make. If you are listening in and you have a phone that you can mute, we would much appreciate it because every noise that is made is amplified and broadcast throughout this hearing room quite loudly.

If you don't have a phone that you are able to mute, I would just ask you to recognize the fact that every knock on the door, every greeting of a fellow employee, every turning of a page, every shuffling of a coffee cup is broadcast in this room very loudly, and we ask you to consider the audience here a little bit. Thank you.

MR. TRASK: Our next speaker is Will Boschman. He is with the Semitropic Water Storage District. He will be talking about Semitropic's activities and programs.

MR. BOSCHMAN: Thank you for the opportunity to tell you a story about a water district in the southern end of the valley.

I had handouts --

COMMISSIONER BOYD: If I ever figure out

who the page turner is out right now, I am going to personally throttle them, but recognize again, we are having noise broadcast in the room. Excuse the interruption, it is a pet peeve of mine.

MR. BOSCHMAN: I had some handouts, but I probably didn't have enough, so if anyone wants a copy of the slides, give me your card, and I will either see that you get one or send you one through the mail.

I wasn't sure how to prepare for this presentation. We have a story to tell in the sense for the water world and also in the energy world and each one takes more than 30 minutes. So, I am trying to take the best of both or the key points of both and combine it into this presentation. I hope it helps to understand our world and how we operate.

The first of it will be our water, our primary objective is to deal with water. How we developed our energy concerns and energy issues, and then finally how we in our own way solved to some extent our energy problems. It doesn't mean we don't still have problems, but we think we have started going on a better path than we were at one time.

We are arguably uniquely located in the southern end of the valley where we connect both the friant system as well as the state system.

The way we operate it is really beneficial to have plumbing to both because as you will see in our water management, we do move a lot of water back and forth.

This is the current county line up here. California Aqueduct, Friant-Kern Canal here. That is a federal system, of course, and we have these lines connecting to both facilities. The primary source for our surface water is from the California Aqueduct. We do also have connections to the federal system through our neighbors.

What that allows us to do is not only manage our own internal water, but also to help operate our groundwater storage program that I will tell you a little bit about.

It allows us to take water when it is available from the Friant, take it in, take it in for storage, return it to the Friant, and also from the state into Semitropic and store it for a number of years and return it to the California Aqueduct or the Friant system. Or we can move water straight through depending on what kind of year.

I am telling you this because all of this requires energy to move water back. Even though we are in the flat part of the Valley, it is really the lowest part of the Valley, but it still requires of course a lot of energy to move it.

A banking program, it is a storage program that has now been in operation since the mid 90's. It has a defined storage capacity of 1.65 MAF, that we have the ability to put water into storage, 140,000 af per year minimum up to 400,000 af a year. Also the return part of it, anywhere from 290,000 af per year to 423,000 af per year.

We are not at that level now, but that is what we currently in a sense permitted through environmental documentation and we are under construction. Half of it is basically at operation already, so we are in the development stage of the entire program.

The participants in the program are -- most of them are, you've got the Metropolitan Water District, Southern California, Santa Clara Valley, Alameda County Zone 7, Newhall in the Bay

Area, and then Vidler Water Company. We currently have this part here that's available as far as the 1.65 MAF of storage that is the entire program.

We are currently developing this part of it here, and there is 450,000 af of capacity available right now for new participants.

They are located essentially all over the state from the Bay Area basically and the Southern California. As I mentioned earlier, we can also reach other areas of the state by receiving water as well as returning water through exchange. So, it in a sense covers most of the developed part of the state except for the Northern part of California maybe.

Our operation -- farmers use 500,000 af a year on average. That water is supplied primarily from the groundwater basin. We try to get as much as surface water in as we can. This slide shows how we bring surface water into this facility, metered, and it is simply replaces the well water that a farmer has been using in that year.

This is somewhat of an example of the so called conjunctive use. I know there are a number of definitions of conjunctive use, but it is simple a switch from surface water to groundwater. And we very much operate that way. We provided the plumbing so we could move from one to the other depending on the water supply and also as part of our groundwater storage program.

As part of the recovery system, this is a typical district-owned well. We also use -- let me go back. We also have contracts with the farmer to use the well when he is not using to recover stored water. Typically, as you probably know, a farmer's well is idle most of the year or a lot of the year, 50 percent maybe.

We have contracted to use that well when he is not using it for purposes of recovery of stored water for urban partners.

What the ultimate program will look like, and we are not to that level yet, but each dot represents a well that can be used for either irrigation purposes or recovery of water.

This is a return facility about 300 cfs. This will be 700 cfs back to the aqueduct. There are actually two ways. We take water in as well as return water to the same facility depending on what kind of year it is or what type of year it is.

The blue is already constructed, operational, all of these wells are pretty much available to us. This is part of the new additional load that I will get to a little bit later. This is a pipeline that is currently under contract for construction, 120 inch pipeline. It's about seven miles. Hopefully a year from now, it will be close to being finished.

Typically, our water is brought in in the normal sense. Then we have had to rebuild our facilities to return water, move it back towards the aqueduct from the various well locations.

This again is an indication of how we switch from one pump to another. Some points are always idle part of the year, and in some cases, all of the year.

MR. TRASK: I'm sorry to interrupt. We are getting some noise from somebody on the tele-conference. Thank you.

MR. BOSCHMAN: This is our largest reverse flow facility which is designed to move water again upstream in a sense from the aqueduct. This is actually our district-owned canal. These pumps are there for (indiscernible) purposes. As well as this one here, it is a 300 cfs facility that moves water back to the aqueduct in this area. It is also idle except for the (indiscernible). Its value is in the fact of being there and ready to pump water for drought year protection for our partners.

That is a fairly good sized load there and mostly idle. We do use that as a pin stock to run a hydro plant here which I will get to a little later too. It is actually used more for that purpose than it is for returning water.

Our primary purpose is to stabilize our groundwater basin, which we think we have done fairly well over time. I won't go into detail, but basically the top line represents the actually pumping lifts. This is in a sense the water in storage over here, but on average I think our pumping lifts some of them have leveled off from where they were actually here in the early 60's and 70's compared to now where they are pretty much stabilized because we started managing the basin a little better.

Our energy problem sort of developed -- this is in the early 90's, our system is pressurized. Each line represents a buried pipe line, each dot represents a delivery point, so all of the system deliveries are pretty much require energy for pumping, even though we are in the flat country, it is still takes quite a bit.

Each dot represents a pumping load that was metered on an individual basis. This is the early 90's. What that resulted in is our the demand charges were killing us. This is a typical surface water load center, a substantial amount of horse power. As I mentioned earlier, our recovery system is located right along the canal, which is also a load center. Again, some years and some time of years these were also idle.

We had all these demand charges that were frankly killing us, and I don't mean to talk negative about our utility, PG & E, but in those years, they were not cooperative in helping us solve that dilemma.

Our Board is pretty progressive thinking and they were ready to do something because we weren't getting cooperation. So, what we started doing is looking at our demand load which is sort of a typical annual demand, the red line reflects higher usage in February/March, and then it peaks again mostly in the summer time.

There is a hole below when you think

about on-peak deliveries, we can't shut off in the afternoon. This is what PG & E did to us at the same time, this is their rate here, and right when we need it the most, summer peak kicked in, and that worked against us too.

This was a real problem that our Board tried to solve. Remember all of those demand charges we were paying in addition to the actual energy charges.

How we dealt with it was then was it started with our own distribution system. We built 40 miles of 12 kb distribution and connected all of those loads together on that line. We had the right of way already for -- this is our canal here, and we just built our own system up and down the 40 miles of canal. Then we asked for single point service at a transmission aligned where PG & E had a transmission running 115 kv, asked for single point service.

That in itself was a significant saving. In fact, the savings and demand charges paid for the annual long term debt service of the entire 40 miles of power line. So, we are breaking even at this point in a sense.

Then we went to the air pollution folks

and all got permits for two MW of generation at each of these sites. I said, okay, we are going to start generating. We now have our own lines for our own service. We will start generating using natural gas. This is the time when natural gas in the early 90's, you know, was very very attractive.

We started on the path of generating our own, and we were still really not getting PG & E's attention until we actually built a couple of them. We built our own gas distribution to several sites, and we planned to do more of it. At this stage, they came to us and asked us whether we would consider, which we had been wanting for a long time, some special consideration.

They came out and looked at what we were doing, we were doing it first class, we were able to manage it all ourselves, we had or own electrical contractor to help us. At this stage, we had two of them built, two sites built and hooked in. They said let's sort of make a deal, and we did enter into a contract which ultimately generated the Ag 5B transmission line discount rate.

To this date, I don't know if anyone

else is on that rate, but Semitropic is on that rate, and it is available for anyone.

That is where we were at that time, and in the early 90's like I mentioned earlier, we put in a hydro generator on that line I talked to you about that also feeds into our grid here. It is essentially a one MW hydro plant, and now it is running all the time.

We had to do something more to our distribution system, so we built a 115 kv service from PG & E in here, we simply added another 15 miles along here and put in a couple of more substations in order to help balance our load between the different ends of the system.

Now we were pretty much in business, and now we are looking at more ways of doing what some self generation that made sense. As we speak, we are just putting on a line in this one MW solar generator. It is also located next to the grid, our own grid. By the way, we are right now sending out invitations for a dedication on the 29th of April. If anyone has an interest, it is kind of an open dedication.

MR. KAH: Have you arranged for a sunny day?

MR. BOSCHMAN: Yes, it will definitely be sunny. We are looking forward to getting on line. It is already producing some energy, but by the 29th, we hope it will be all cleaned up and finished off, and we will have a day of celebration in a sense because we are also talking about hydrogen.

Another dilemma we got into was our fleet of vehicles were 20 years and were on propane and beyond my understanding, propane is no longer a good thing to use, so we were forced to go back to natural gas or regular gas and diesel for our fleet. Now we are looking at well hydrogen makes sense, but of course the governor and others are pretty open to pursuing that, so we are also open to developing a pilot program on hydrogen-fueled vehicles. We will have one available at this dedication.

Solar of course, you know, it really helps us out in the on peak, so it made a lot of sense to until noon when the rates are in our case, our rate is 5.3 cents. In the afternoon, it really pays off because we are avoiding 15.5 cents in our case to buy power from the single point service utilities, so we can actually see when this thing comes on, our demand at the utility goes down of what we pay.

We've also started thinking about more of these. If this really works out and they match the funds, which in my opinion, need to be there in order to make it work, our Board would not have considered it unless there was some form of matching funds. It is still not a big money maker, but our Board is open to looking at the future. If this will be beneficial in the future, then the maintenance of these as you know are fairly minimal, whereas we tend to predict that utilities rates are going to go higher. We think in the future it really makes more sense.

Our future facilities, that other part of our banking program that I mentioned earlier. It is going to require another 33,000 horsepower. In order to make that work, it is probably the worst horrible load that you can imagine. It is there, ready to go, but only in drought years. Most of the times, it will be there operating from zero to 33,000 horsepower, so it depends on the hydrology. It is going to be interesting how we solve that particular problem.

Right now we are thinking of extending a

115 kv line up here and maintaining our one point service over here. It also lends itself to more solar we think. We are starting to get indication that solar is coming in with a larger unit. If for 15 to 20 MW were feasible today, we would probably build it because we can have it stand by for this potential load and sell the excess to the utilities.

That is what we look like all together today. With our future coming up here, this is kind of a composite of all of our loads and our 12 kv 115 kv and the generation points.

We are also I mentioned earlier moving water back and forth from the state system to the Friant and storing it in between. This would be an example of what we are in a sense working on. This is the two way 120 inch pipeline that is currently under construction that will connect to our system here. We are already able to move some water through the front and back and forth.

The second one is also planned, and the third one here, and we will also expand that probably to a point where ultimately -- our ultimate goal is to be able to move water should it become available -- right now, for example, when there is plenty of water in a sense, in a state system up north, we could move water into the program, store it, regulate it, and move it into the Shafter-Wasco, our federal neighbor on irrigation demand basis, and then they would leave their water in the Friant system which then could be used for any user on the Friant system.

This is an example of how ultimately we would be able to manage additional water that may be unregulated and we can regulate it and move it around. That is basically our story.

COMMISSIONER BOYD: Thank you. That is very impressive, very progressive thinking. Questions?

MR. TRASK: I have a question, Will. I know you are one of several entities down in Kern County that are doing groundwater banking. I believe you are the second largest, is that correct, behind -- oh, you are number one, okay.

Any idea of the total in Kern County?

MR. BOSCHMAN: I know there is planning right now for about four or five in the planning works. Some are operational. Arvens Edision Storage District has one that's -- and of course the Kern Water Bank. Arvens and Semitropics so far I believe are the only ones that serve out of county interest.

Kern Water Bank serves local interests, local participants. We are one of those, we have part ownership with Kern Water Bank. There are some others that are in the planning works, but I think Arvens and Semitropics are the only ones operational at this point. Arven serves the Metropolitan Water District.

MR. TRASK: It seems likely that there will be others like you in the near future.

MR. BOSCHMAN: I think it is something that is definitely going to happen. It seems to be concentrated somewhat in Kern County. I believe that groundwater storage is going to be part of the future solutions to California water supply. We've got some rules that we have to overcome, understanding water quality, how waters are mixed, and those kinds of things to really make them work the way we hope they will.

MS. NELSON: Natasha Nelson from the Environmental Office here at the Energy Commission. You just said the word water quality, and I am wondering if you have to clean your water. I know that places like Imperial have to clean selenium and sodium from their water before it can be released back into systems, and that can cost $200 to $500 per acre foot. So, are you not confronted with that problem, and do you think that makes your district unique that you are not confronted with that problem?

MR. BOSCHMAN: You are hitting our problem right on the nail on the head in a sense. Yes, we are in a situation where we need some long term rules for what I call mixing or co-mingling raw waters. We are putting it in the aqueduct, it is still raw water, could we treat it downstream. The question is, do we have to treat certain constituents in the water coming out of a well and the water you put in the soil is obviously not the same that comes out on a quality sense.

If there is a mismatch of going back in the aqueduct, what are the rules for doing that, and we don't have very defined long term rules. We are willing to treat, but it just going to cost some water users double treatment. It is still raw water when we release it into the aqueduct. In one sense, the quality is excellent, TDS maybe 160. In a drought year that is very good. On the other hand, other constituents, including arsenic, could be hire than what is in the aqueduct. It probably will be. The aqueduct arsenic is low.

Tell us what the rules are is what we are asking now. In fact, we are meeting with the director next Monday to help us, to give us some long term guidelines that we can rely on because we are talking about building a fairly substantial treatment facility to handle that 700 cfs of water if that is what we need to do.

MR. TRASK: Will, is that the state Water Quality Control Board that you are working with on that one, or is that the Regional Board?

MR. BOSCHMAN: It is the State Water Department Water Resources.

MR. TRASK: Oh, okay.

MS. TURNBULL: Jane Turnbull, just two quick questions. Can you tell us how this is paid for, and secondly, have you looked at or been in negotiation with any other groups that are talking about desalination along the coast, and would that have any kind of impact on your program?

MR. BOSCHMAN: First of all, it is funded entirely participants that we contract with, 100 percent. That is our program.

MS. TURNBULL: What is our annual budget

at this point?

MR. BOSCHMAN: It is on the order of $20 million to $30 million per year. A lot of that has to do with construction work, money that is coming in. Our internal operation is significantly less than that, probably more like $10 million.

The other question about desale. I think obviously that is going to be part of the future of California. What I find kind of interesting and I am trying to promote it is, why not -- there is water that is not useable within the central valley, we know that, drainage water and farm. Why can't instead of up on the coast where anything you treat on the coast has to be pumped up to a user in some way, why can't that Central Valley water be treated. If the infrastructure is already there to move it to wherever it is needed. That would solve several problems in the Central Valley as well as water supply. I don't know if that answers that your question.

MS. TURNBULL: I think it does, thanks.

MR. BOSCHMAN: I think that is something is frankly is being overlooked. Why can't we clean up some of the Central Valley water rather than the coastal water, and then we could move it to almost anywhere in the state.

COMMISSIONER BOYD: I may be mistaken, but it is my recollection that the study that DWR did a year or so ago, I think we actually participated in, did point out that there is a lot of brackish water in the state other than coastal water that is definitely a candidate for that kind of work, so I think perhaps it has been identified, to what magnitude, I don't know. It is a good point.

MR. BOSCHMAN: In the district, we have some water, it is very minimal, but for example, a power company that we are dealing with and then things kind of turned around, but they wanted it regulated. It is a relatively small amount, 4,000 to 5,000 acre feet a year guaranteed. They would pay for cleaning up that water that is not useable, even for agriculture internally, we would treat it, use it for agriculture, or put it in storage for them and then release our entitlement on the system somewhere for their benefit on a regulated steady basis.

Those kinds of things are really I think worth while pursuing on a bigger scale than what we are looking at.

MR. KLEIN: Mr. Boschman, when we spoke on the phone a couple of weeks ago, you told me about connections between what you are doing and sort of flood control things. Can you talk about that a bit here?

MR. BOSCHMAN: We are involved in a study with other neighboring districts, Cawelo and North Kern Water Storage District on a dam that has been looked at a number of times, but again, is being looked at on Poso Creek, which has a historical flood problem.

A corp of engineers is currently studying that. We are paying a fair share of that for that study because it predischarges into our district when the flood is basically on land owners, so we are interested in that. That is currently being planned, not for any hydro generation, but it could very well in the future years maybe be converted to a for pump storage.

For example, out of the Friant into the reservoir and then generate some hydro back out. That is I believe what we were talking about a little bit. That is a potential down the road.

MR. KLEIN: Thank you very much. I remember that we did chat about the idea that it might be both used for pump storage as well as the flood control, and perhaps we ought to do something to talk about that officially so we can get that into the study. Thank you.

MR. TRASK: Will, you did mention earlier about your one pumping plant that is also a hydro electric plant. Could you expand a little bit on that?

MR. BOSCHMAN: Our hydro plant is simply a turbine, it is not a pump that converted. It is not a facility that is used for pumping in for hydro, it is simply for a hydro generation. It is next to that slide where we had our big pumpback plant. That is basically what it is.

COMMISSIONER BOYD: Is it just a run of your canal water so to speak?

MR. BOSCHMAN: Right. I believe they are not in the Central Valley, there is a 60 foot drop. If you drop it through a 78 inch pipe, you can get a little hydro out of it.

MR. TRASK: While we appreciate the comic relief of the tele-conference participants, we will ask once again for those of you on the tele-conference, please watch your noise otherwise, we will have to terminate the tele-conference. Any other questions for Will Boschman?

I believe we are now scheduled for our discussion panel. I would invite all those speakers that gave presentations this morning, plus other people who are on our discussion panel to come up and sit in the chairs up front here.

Virtually, anybody is invited. We are not excluding anybody. If you want to come up and sit, if you want to come up any time and ask questions or participate, that would be great.

Don't make me beg the tele-conferencers to be quiet please. I believe we lost Commissioner Boyd for a minute. Why don't we just go real quick around the table here and introduce ourselves. There are few new names and faces.

MR. ROBERSON: Mark Roberson Bay Delta.

MR. DALE: Larry Dale, Lawrence Berkeley Labs.

MR. TRASK: Matt Trask.

MR. HOWES: Dan Howes, Irrigation Training and Research Center.

MR. CANESSA: Pete Canessa, Center for

Irrigation Technology.

MR. KAH: Gary Kah, Aqua Metrics, former PG & E pump test manager.

MR. SHAFFER: Steve Shaffer, Department of Food and Agriculture.

MR. TRASK: The first topic that I would like to throw out there is kind of the differences between Dan and myself here. Dan did put up an estimate of around 10 GWh compared to our about 2.3 GWh of pumping energy loads.

Our data comes directly from meters, so if indeed, Dan, your figures are accurate or even close to accurate, there must be a lot of pumping that occurs other than ag meters. Any thoughts yourself or others on the panel of where that energy is coming from, what kind of accounts it is coming from, and why we are not seeing it in ag meters?

MR. HOWES: I know that Western Area Power Authority, I'm not sure how they report through the -- I know that the energy is wield through generally the utilities. However, I am not sure how it is reported. You could be missing some of that.

We also included in our estimates the

conveyance, the pumping required to convey water to irrigation districts. I think someone made a point that they were interested in that number. That number was on the table and can be found in that report which is available on our website.

I think also just looking at the volume of groundwater pumped, the rates could be under commercial, it could be under industrial. You know, just looking -- I had an example on my power point to go through if you asked me the question while I was up there. Maybe I can bring it up.

Just looking at a quick example. This is a type of methodology that we used, but we used it on a regional basis throughout California, so we looked at the South San Joaquin Valley and the Sacramento Valley, a total of about 13 or 14 regions.

If we look on a statewide basis, and we said the average groundwater level from the surface was about 150 feet, which is a reasonable estimate in the Sacramento Valley, it may be 80, 40 to 80 feet. In Semitropic and down in Kern, we saw from the slide it was about 275 feet. It ranges in other areas to greater than 300 feet.

Using a 50 feet pumping lift, draw down

of about 35 feet with a discharge pressure of 9 feet, all reasonable estimates I feel, if anyone wants to argue then we can discuss that, as Pete said, the average pumping plan efficiency is around 52 percent throughout California. In turn, leads us to about 300 in 80 KWh per acre foot pump.

If the pumping estimates are right, which I think they are pretty close, we have a confidence center on them of about 10 percent, meaning that we have about a 95 percent confidence that we are within 10 percent of this 12 million acre foot value.

It shows right there that we have about 4.56 million MWh per year of pumping. Now some of that may be attributed to diesel and natural gas, so it brings it down to actually it becomes to very close to what our estimate was about 4.5, a little less than 4.5 million MWh.

The estimate that I think we are seeing from the actual utilities is about 2 to 2.5 million MWh or 2,000 GWh or something like that, which is much less. I really believe that somehow the ag rates aren't showing us everything that is going on in the ag sector.

Now, this is just one component, groundwater on farm. We have groundwater by irrigation district as well as booster pumping and pumping to convey water to irrigation districts. So, that is where our 10 million MWh came from.

MR. TRASK: Maybe I will throw it out to the group there. I think your last statement is perhaps the most crucial for us. Somehow ag meters are not showing everything of ag load. Any ideas from the group or the audience of why that might be and where that energy is embedded? It is a mystery.

MR. ROSENBLUM: Can I? I am John Rosenblum. I've looked at accounts, and oftentimes, the utility accounts might be for a building where there is a well on the site, or there is an irrigation pump on the site. So, sometimes you are not picking up from the utility data that it really is an agricultural use.

MR. KAH: Dan, could you explain the 12 million acre feet number because I mean I just remember 10 million irrigated acres --

MR. HOWES: Sure, I would be happy to --

MR. KAH: -- and in the context of surface water too because --

MR. HOWES: Sure. We have interviewed over 100 -- actually surveyed over 100 irrigation districts throughout California, more throughout the western U.S., including asking what their average surface water deliveries are during a typical year.

We then bring that into our regional (indiscernible). We have estimates of evapotranspiration of irrigation water through over ten years of doing irrigation system evaluations, Cal Poly has put together a very complete analysis of the distribution uniformities in irrigation efficiencies are on farm throughout the state and by region.

The Center for Irrigation Technology pump test data base for on farm, we were able to come up with estimates of regional pumping plan efficiencies. Putting all of this information together, we were really once you look at evapotransporation with irrigation efficiency, reaching a requirement, frost protection water, you can subtract the surface deliveries from what is required, and you can obtain the estimate of groundwater pumping.

To my knowledge, that is how most

agencies do it. We didn't use other agency's values to come up with our estimate. We used our own because we wanted to have a fresh look, and we felt that our values of irrigation efficiency and our values of surface water irrigation and conveyance efficiencies on the district level were better than anything out there. So, we took a fresh look at this when we came up with it.

MR. ROBERSON: Dan, on the total (indiscernible) water, it looks a little bit higher than what the water plant had projected. I think they are around 30 million acre feet, so that might be some of the energy difference. That is just an observation.

A question is, what type of year is that, is that above normal, load normal, wet year, what are we talking, and what would the range be if you did have a year type distribution for power?

MR. HOWES: Right, this was a typical year, meaning typical precipitation, typical surface water, deliveries. The water plan, again, I think you are right, I have it right her at 33 million or almost 34 million acre feet. We are about 2 million acre feet over that, and of course within a ballpark of any confidence center.

Again, I think our values take into account what is actually going on a little bit better. Maybe it is my bias, but they are still within a ballpark range of you know, 2 million out of 36 or 33 million is pretty close. I don't think that is going to have that huge affect, however, I do believe that difference is probably in groundwater pumping which would skew the total energy usage up a little bit. I do believe we are pretty close to being right on on that.

MR. ROBERSON: Would you have a guess if it was a wet year that was reported here, what the energy would do, or if it was a dry year?

MR. HOWES: The dry years I showed in the drought tables. I can bring those up again. A typical dry year meaning not necessarily a drought where you have consecutive reductions in surface water delivery. You can really look as a year one of a consecutive drought. With a 20 percent surface water reduction, we expect to see about 800,000 MWh per year of an increase. 40 percent about 2 million, and 60 percent over 3 million MWh per year.

Again, that is solely due to the shift

from surface water deliveries being reduced and that being made up through groundwater pumping on farm and by irrigation districts.

MR. KAH: Matt, is the ratio we are talking about four to one in round numbers 2. something to 10. something?

MR. TRASK: (Inaudible.)

MR. KAH: Okay, because you can do the sensitivity analysis about Dan's assumption. I use to be in the business of making wild assumptions when I first worked in D.C. during the energy crisis years. You do a sensitivity analysis. The number that is probably the softest is the total dynamic head number because the efficiency numbers and other things, we have a general feel for.

The 195 I believe was the number looks high to me for a broad area of the ag areas on the east side, especially up toward Sacramento. I mean, we used to go out and see a 20 horsepower pump where we were expecting to see a 100 horsepower pump because the water was 15 feet below the surface.

On the other hand, this lift 9 feet is incredibly low in terms of pressurized systems, sprinkler, drip, and so forth. You are blending some things there, but I think that pumping lift number is likely to be the source, or a big source of the discrepancy.

Now the other thing I wanted to mention, and I was alluding to this in terms of growers sometimes using economics, installing a very low engineered well and a fairly inexpensive pump system, even submersible pumps as opposed to the more efficient line (indiscernible) is that in some areas, again, the east side, typically the northern east side, where they have historical water rights of significant size from surface water from a canal, they don't run pumps.

PG & E, not wanting to lose the account, gives them a break in the context of having an inactive account, they don't actually charge them monthly charges and a lot of growers do that just from, you know, November through March anyway, and PG & E kind of looks the other way. They don't necessarily charge them. They shut off the account, and they know they are going to reactivate it. In theory, there is a big reactivation charge that they don't sometimes charge.

Now, this is back in the 80's, so this could have all been cleaned up, but there are some pumps that don't run for years at a time. The installed load potential during a drought year, that is when it all comes on line. People dust off maybe hopefully, dust off the control system, and throw the switch if you will, and all of the sudden, you've got 2,000 or 3,000 50 to 100 horsepower pumps on line that were not on line in the wet years when they had all the surface water they needed.

So, somewhere between the billing data, which I doubt the billing data is wrong by the way, the utility is not going to let MW's at a time disappear in their system. I like Dan's numbers, but they are derived, so we have to kind of look for the sensitivity and where the discrepancy could be.

I do want to point out the inactive account situation in a lot of ag. Now, west side, 600 foot pumping lift, new water rights don't have a lot of access to surface water except in surplus years, they are pumping 4,000 hours a year maybe more. These other pumps on average, in other words, spread out over a ten year period might pump 1,000 or less hours a year.

Now, when they are pumping, they are pumping 2,000, 3,000, or 4,000 hours a year. If they are off three years at a time, the long term average is maybe just 500 to 1,000 hours a year. So, there is something happening there in terms of what the utility is telling you in terms of connected load and then maybe creating a number that doesn't reflect actual capacity use versus the assumptions that you have necessarily had to make in terms of pumping lift. So, probably worth -- I mean the 195, that is an area weighted delivered water weighted number?

MR. HOWES: That is actually just an estimate that I put together --

MR. KAH: Okay, there we go.

MR. HOWES: -- and it came out to look pretty good, but --

MR. KAH: I understand.

MR. HOWES: We looked at it on a specific level on a regional basis. We looked at the South San Joaquin Valley, we looked at the east side, we looked at Fresno, Sacramento Valley. So, you know, there is a lot of variability in that, and I understand where you are coming from that yeah, on the east side and up in the Sacramento Valley, the water level is very shallow, but where you see the bulk of the pumping down in Kern County and along the west side and along the east side in the Southern San Joaquin Valley, you know, that is getting your weighted average in, and it does come out to be about 150 feet for the pumping water level.

MR. KAH: If it was plus or minus 10 percent, we wouldn't be talking about it. If it is 400 percent, it has got to be looked at, the differential is what I am saying.

COMMISSIONER BOYD: Dr. Wilkinson, I saw you rise there a couple of times. Did you have a question or a comment?

MR. WILKINSON: I do, thank you. Bob Wilkinson, University of California Santa Barbara. From my standpoint, the methodology you are applying is quite useful and good, and I think what we need to do is I would encourage the Commission to look at some kind of small group that might want to noodle on this subject further between the utility companies comparing some of the metered data because I agree, it is definitely level of groundwater and that changes through time. That has a big implication for energy use.

So, if we go into multiple year dry cycle and the groundwater levels drop, those are curves, they are not linear, so this is very important. This is very important to the study we are doing for PIERS as well, Dr. Wolff and I, to get the methodology clear and then compare that to some of the data we've got from places that are metered where we have groundwater depth, pump efficiency, and then calibrate this. I would encourage follow on work and like to be part of that.

MR. TRASK: I will say that I was quite impressed with the ITRC study. When I read it through, especially impressed by the level of detail you were going to, the use of GIS, it was really the only study that I've seen that really tries to you use real world data to come up with those estimates.

MR. HOWES: It is available for everybody on our website if you want the e-mail address, I can give it to you. Please, we put everything out in the public, so we can be scrutinized and defend ourselves.

MR. TRASK: Gary, I wanted to follow up

on one thing you said there. You talked about inactive accounts. Most of these are connected, they are just not ever used. We have heard of some that aren't connected, the pumps are sitting there, the motors are sitting there, but they are not connected to the grid. They are waiting for that third, fourth year of the drought before they would get interconnected. I guess that is one of the bigger concerns that we have of this load that perhaps even the utilities don't know about.

MR. KAH: You know, when you get out into the I don't know, there were ten districts that I had staff in each of the ten districts I would say. You know, when you go out to the rural areas, I am from a rural state, I am from Ohio and so forth, the rules aren't always, you know -- I mean -- and I have to tell you, there will be a breakfast meeting a couple of times of year with PG & E representatives and so forth and they talk through various things.

The fact that farmer Susan, you know, wants to not pay the monthly charge, I mean, maybe PG & E would go out and pull a breaker on the pole, you know, from the actual transformer, but usually not. It doesn't mean that it is not going to be metered. They may not even go and read the meter for six months if it is an inactive account. Why send someone out there, it is a trust kind of thing.

I think that is fine in a sense because there is a lot of cost involved sometimes that aren't necessary. Anyway, I think there is some friendliness in terms of the way rural PG & E offices deal with their customers. They don't want to lose those customers, they are neighbors, but I doubt there is no free energy going out there, I know that. There is a meter on those accounts, and PG & E has the ability these days to actually measure the power going out into the sub stations and so forth, and they do the mathematics, there is a certain amount of connected load, it is the middle of irrigation season. I mean they can back check actual energy demand.

On the other hand, it is difficult when you are doing analysis of KWh in a certain years versus how many accounts there are when you are talking about 86,000 accounts. It could actually be more than one motor on some of those accounts, you know, a pump station with a big honking almost a sub station powering it. It could be two or three pumps on that account. So, anyway, it is a very difficult thing, and I struggled with it for almost two years basically trying to understand how many -- I was trying to build -- I took a pump test program that had been in place since 1923 and doing 10,000 pump tests a year and converted it into what I call an irrigation system survey program where pump tests were part of that, but it was an on farm analysis thing.

It turns out that 3,000 or 4,000 of the 10,000 tests we were doing a year weren't really worth very much. They were quicky tests sometimes done from the cab of the truck if you follow me.

We got down to about 6,000 pump tests a year the year I finished up the program, but they were much more accurate and involved in on farm irrigation efficiency, irrigation scheduling, that whole thing. So, pump testing, well efficiencies, these are tools, the bigger picture that was Pete was mentioning is how the farmer interacts with that information. They have a business to run.

They have to deal with application efficiency, scheduling, as well as pumping. That is how you -- I liked his approach of non point source and businesses out there that are going to react to price signals and incentives.

MR. KLEIN: Matt, can I ask a question?

MR. TRASK: Sure Gary.

MR. KLEIN: For the group, I'm not quite clear who ought to try to answer it, but it seems to me it was mentioned earlier that there is a certain cost to doing pump tests and irrigation system tests, whatever we call this comprehensive approach looking at the farm water use. What is that cost if we were systematic about it and planned on it as a way of improving overall energy efficiency or conversely preventing future demand. What would be the cost of that and how would that compare to the cost of maintaining a power plant of the same capacity?

Maybe there is a trade off we ought to look at that we ought to think about it a bit more systematically and long term that if we really want the resource or to prevent the future demand of the resource, we ought to look at it as an alternative comparison. Anyone want to take a stab at that, or do you want to mull that one for awhile?

MR. CANESSA: Were you asking the actual

cost of a pump test?

MR. KLEIN: I'm sorry?

MR. CANESSA: Were you asking about the actual cost of a pump test and what the farmer gets out of it?

MR. KLEIN: I'm thinking in part that, but let's imagine you had the opportunity to run a program where you thought about 89,000 pumps in that service area you are talking about or 86,000 pumps. Think of it as an annual maintenance program, and you are going to do something rather than on a gee, I get a call basis, a systematic approach to maintaining a certain level of efficiency and reduced energy consumption in the system.

MR. CANESSA: A program like mine, the budget, a lot of it depends on, you know, going into 2006/2008 cycle, it depends a lot on what the utilities think. Again, there is a lot of aspects involved here because of just looking at strict energy and the problem the state is being faced, the utilities have been given huge goals for energy conservation in the next three to six years.

In terms of loading and in terms of

resource acquisition, energy conservation is number one above all else. Again, we've got limited resources, so from the utilities point of view, if they are looking at ag versus something else, they have got to say where are we going to get a bang for our buck. So, this is where I again we talk about multi-agency funding where energy in ag is not really a priority issue with the utilities in terms of their priority problem.

If you add on air quality and the water conservation actions in this group like mine, now I have got sufficient funding to do what you are talking about. We will -- I've operated let's say in PG & E which is 85 percent ag activity in the state, so I will just use that as an example.

We have operated with $2 to $2.5 million a year. Right now we are probably operating with $1 million. That just kind of sets how many tests I can offer. In that sense, we quit testing on the pump every year which used to be kind of the norm. We will only test a pump every two years. If we have that pump on our records below 30 percent, we won't test it again.

Again, with the money we are working with, we are supposed to be incenting people to do something, we are not just supposed to be rewarding the guy to do something. So, if we have got a pump that is under 30 percent, we are not going to test again. We would say, look, go repair the darn thing.

In terms of a long term effort, you know, it does take a long term effort. We have told our testers we can put out our purchase orders. We will say, look, you know, 20 percent of the pumps you give us better be new pumps that are not on our data base.

You know, we did 8,700 tests under ag peak load, we have done 5,400 under the PUC money, but again, we've got 86,000 pumps. There are a ton of pumps out there that haven't been tested, and the way our pump testers work, they are likely to go out there and just test the same pumps year after year. I am not going to get much bang for my buck because you know, they are going to make money easier doing that way, so we have to force them in the finding new opportunities so to speak.

That is why you need that long term. In terms of the cost and what you get, I mean, we've saved 13, you know, all verified because we do pre-test and post test on our pump repairs. So, according to criteria everybody agrees on, we've saved 13 MW in the last three years.

If you look at the money we spent, that is like 7 cents a KWh on an incentive basis. That is pretty cheap in the scheme of things. There are some things, CFL, depending on how you feel about it, they are changing standards. Used to be the cheapest, but 7 cents is not bad for a resource acquisition.

You know, you could look at it any number of ways of how you are going to fund it and what effort you are going to make. A lot of it comes down do you go out there and buy the resource or do you conserve it.

MR. KAH: I think there is a big opportunity -- first of all, you segregate the market. There are large incredibly efficient ag operations that have permanent staff that are dealing with their pumps. I mean they are operating very efficiently period. Some of those tend to be on the west side where you have 600 foot pumping lift, you've got to do it.

Or there used to be, and I don't know how the Valley has changed too much, but then there is a whole middle range of, you know, professional growers, been in the business maybe a family farm and so forth, but they would ask for a pump test every year from PG & E at the beginning of the year because they didn't really know the flow rate of that pump. They wanted to know the flow rate to do their irrigation scheduling.

The flow rate would change because water levels have changed and pumps degrade with time. In lieu of a flow meter, they would have PG & E come out and do a free pump test. They would look at the flow, 600 GPM, and probably throw the sheet of paper away and not look at the energy analysis and the payback analysis and all that, they were simply using PG & E as a flow meter at the beginning of the season.

You know, with today's digital equipment, you can almost have like a real time pump efficiency meter on a reasonable sized pump that would go a fair way down the road of feedback to the grower. You have these best management practices farms of thousands and thousands of acres using, you know, the absolute minimum amount of electricity and water most likely, and if you could use that as a best management practice and kind of engender a little bit of competitive nature in people and say, they are using 2.9 acre feet per acre of applied water. You are three miles away, same climate, same soil, and you are using 4.2 acre feet per acre. Somebody starts to do the profit analysis, it turns out they can get down to 3.5 or 3.2 instead of 2.9, they can't get to 2.9 because they are not that efficient and can't be, but it is going to maybe add to their profit by 30 percent. All of the sudden, you've got their attention.

You know, pump testing -- what I realized after two years of analysis and talking to my staff and everything that it was being used not inappropriate ways, but being used to do other things that we weren't really aware of.

The program had been grinding out 10,000 pump tests a year and no one had ever been asked to look at that. So, I think, Gary, your question is, is there an overview analysis or products or services that can be offered. I would say there are some gentleman farmers where it doesn't make that much difference. There are the larger growers, could be family owned, it is just a big operation with professional staff. You are going to learn from them, you aren't going to tell them anything.

Then there is this middle range where people are good practices and so forth, but they are not on that edge of saving energy and optimizing.

Keep in mind that a lot of these pumps, at least the original type pumps, were line shaft driven pumps with a big adjusting nut at the top. They can be adjusted for efficiency as well as just tested to see what the flow rate is.

In other words, there is a need for someone, and it is usually just the pump dealers that sold the pump to grower and so forth to periodically do a flow test, do an efficiency test. Has this pump come off of its curve, and a couple of tweaks -- you are talking about wrenches that are six feet long, but you are tweaking on that adjustment, and you can get three, four, or five percent efficiency, you know, in an hour or an hour and a half. So, there is an on going efficiency thing, there is the installation efficiency thing, you know, incentivizing the high efficiency motor at that time.

Yes, there is a big set of programs out there. It is deserving of a look, you know, segmenting the market, and attacking that market with things that make sense. I would think that over time with electronics as they are, we can move towards giving the growers what they need, a flow reading, and saving our bullets for other things that can produce MWh savings or MW savings in the peak period.

MR. KLEIN: It seems to me those same electronics could be used to longer, long term efficiency, short term efficiency, send that to a maintenance facility if you will, so someone is watching for it other than the grower that actually has to pay attention to growing, but someone is maintaining that power plant, if you will, at some reasonable level of efficiency on a long term maintenance effort.

The same electronics that give them the information right up front can give somebody else the same information to help do what they ought to do which is to maintain the power, the efficiency of the system.

MR. HOWES: As part of the Peak Load Reduction Program, one of the districts along the eastern -- I guess I can say who they were, Orange Grove Irrigation District, who has been very proactive with SCADA and other variable frequency drives put in flow meters, input load or input KW meters so they actually have real time measurement of their pumping plan efficiencies.

Since they have large pump stations, they pick which pumps are going to be in what (indiscernible) stage based on pumping plan efficiency, further enhancing their overall efficiency on a district wide basis. So, that is one type of example of what can be done.

MR. KLEIN: Thank you.

MR. TRASK: We are hitting the end of our time here, but I would like to maybe indulge everyone to go another few minutes here and focus a little bit on what Pete talked about in much of his presentation which is sort of the psychological challenges of integrated energy planning into water planning.

One thing that I see is missing as compared to other industries that we've worked with are just on going just about every day reevaluations of their systems looking for cost savings.

We talked about some of the new motors that are available amazingly quick payback periods. We see in the oil industry, for instance, they are swapping out motors as often as twice a year and turbines for that matter as well.

Pete, in your program and Gary, you might know too, what is the process, how often are people reevaluating, are irrigation districts on a district level compared to the farmer on an individual level. What is going on in that area I guess?

MR. CANESSA: I think it is an important point to recognize that even with a program like mine, I mean, I am looking at different markets. You know, I am saying 86,000 pumping accounts and diffuse and maybe I am implying that we are dealing only with farmers, but we deal with any pumping account, and that includes irrigation districts.

Any time we help a district repair a well, we are getting a ton of savings because these are high use, high powered wells. Irrigation districts are professionals. You know, I was extremely impressed with Semitropics. They are charged with low cost to their owners which are farmers.

Sure, they are going to be a little bit

more tuned to this stuff. For example, our pump repairs come in on an average of 31 percent efficiency, and they are post tested at 61. But I would bet our districts are probably coming in around 45 or 48 because they know what the economics are.

We have had district pumps come in at 55 or 56. When we move into municipals, I was talking to the City of Santa Barbara and the California Water Services, and they are repairing some of their wells at 60 because they are offering 4,000 or 5,000 hours a year, and we are talking to (indiscernible).

Another thing that is going to drive this and you know you talk about predictability or unpredictability, you know, you see a spike to 280 or diesel and that is going to drive electrification, but we saw this with the Peak Load Program. I mean, interestingly enough, and that is why you want to kind of read that paper of mine, we were allocated something like 15 million bucks to install alternative fuel systems for natural gas powered plants.

There were any number of delays in getting that, legislation finally implemented. By the time we got it implemented, natural gas had gone from $11 back down to $ 2.3 or $3, so the money just didn't get spent because the price signal was not there anymore. So, we have to deal with a lot of markets, so sure, when we are dealing with an irrigation district, you know, I chart (indiscernible) most with irrigation districts, and those guys understand what this can do for them.

The farmer, the problem with the farmer, he's got all kinds of uses. I can show him, yeah, you've got a 40 percent pump out there, and I can show you a three year payback because we do the pumping cost analysis at the same time, but hey, I've got a cotton picker, and I've only got a certain line of credit, and thing is still pumping a thousand gallons per minute which is going to water my cotton crop.

Now I use the example of the lettuce grower in Salinas with the economics that he's got. It is entirely different than a cotton grower in the valley where maybe he has only got $500 to $600 in the crop. Without government subsidies, it is not profitable at all, so yeah, maybe I get a little more interest out of him.

We have to look at all of these kinds of things, but the more usage of a pump, the easier it is to get the guy to pay attention. He will, they are business men, but again, they understand the priorities in a lot of different things.

MR. TRASK: One of the criticisms we hear of irrigation districts, conservation districts, people supplying the water, is that they often just pass through the energy costs with little to no thought about it. Is that something you see changing?

MR. CANESSA: People have to understand that irrigation districts and water districts are owned by their member farmers. So to the extent that they are passing through their costs, I mean, I have always thought this was interesting when I was on the water conservation water quality side is that at one point I said, hey look, everybody in the state either looks at the water districts as if they are west lands or what was the one -- there was another one. They looked at it like west lands because they thought everybody had these staff and they were this big monolithic government district. Well, they are not, they are like Semitropic. You've got a general manager, you know, a secretary, and a couple of three guys out there on the ditch.

They are owned by their farmers and their charge is number one, to get water to their member farmers. That is their primary is to get the water to their farmers to the extent they can minimize their administration costs, fine, but you've got to pump water, you've got to pump water. So, we need to see what decision that general manager is going to make in terms of pass through. He is doing an economic analysis, he has to get it past the Board of Directors.

MR. KAH: Yeah, it is really tough. I mean, I had 19 people full time equivalent, and of those, you know, only three or four people were willing and I would say able to step up and become a system analyst. In other words, we had a lot of pump testers, but you had to look for different people to be able to talk to a farmer, and it is their business. You can't step on their farm and tell them what to do. You can help them evaluate data and help them maybe arrive at a different decision, but heaven help you if you try to tell them what to do.

Again, going back to this, if we could

use the facility of ITRC/CIT to do an energy audit for an irrigation district and have some measure of KWh per acre foot per foot of lift and just let them compete with each other, and see who are the most efficient districts out there, keeping their pumps up and so and so on. Normalize it to dimensionalist number if you will is something that they can see that, hey, we are doing a good job, or we are the member/owners of this district, and how come we are in the lower quarter of efficiency. Let's look at that.

You can do the same thing with farmers, although with 86,000 locations, it becomes much more difficult, but you have to I think -- it is like a mileage standard for automobiles. If you can set an achievable standard and let people measure themselves against that, then they can start making a decision whether to put the money into a new harvester or put the money into pumping systems.

I think the technology of helping them exists. You can hire more people. He would be glad to double his staff if the demand was there. The way you create the demand is in pole sense. You don't want to push things out on the growers, it is not going to work. I mean you can't do it with homeowners, how are you going to do it with a grower, but entice them through education and showing them where they stand in this whole scaling of efficient/not efficient, and get them to demand these services and it will start to work better.

Right now, I think it is hard for them to understand, they can't get their arms around their own efficiency analysis. It is not something they are going to do.

MR. CANESSA: One other thing we are dealing with municipals or the irrigation districts and it kind of goes to how you programmatically address these issues. A lot of times we will go out there and do a pump test and say, look, this pump needs repaired, and the guys says, yeah I agree, but my budget is already set, so I will look at it next year, but maybe I am not around next year because my funding agencies work.

So, the PUC is going back to a three year kind of general rate case which is going to help things out a lot, but again, these types of problems you have to go on long term because it may take a little while for the guy to get ready to make the decision just on his constraints.

MR. HOWES: I'd also like to point out another case where along just with savings and peak load reduction, one district was able to save its growers and estimated $20 to $30 per acre foot. That is just from peak load reduction, not taking into account conservation. There are places in California that don't even charge their water users $30 per acre foot. That is how significant this was. I mean it is the difference between paying $40 per acre foot and $70 per acre foot when they are applying 3 to 4 acre feet per acre and you have a 1,000 acres. That is a margin that probably secured that general manager's spot until he wishes to retire.

MR. KLEIN: One last question, Matt.

MR. SHAFFER: Just let me add a tiny little bit because will take just a little bit of exception to one of the comments Pete made.

Oftentimes there is an interesting dynamic between the irrigation Board members and the staff. Sometimes there is a bit of reluctance for staff and management to take on additional responsibility or what have you in terms of technology assistance and things like that.

I see this in some of the discussions within Cal Fed is where the irrigation districts and Board members are focusing on that water supply/water delivery aspect and not necessarily the on farm and production aspects. Sometimes, and it depends, there is a bit of a disconnect.

MR. TRASK: We have gone now well over our allotted time, and I wanted to give assurance to Dr. Wilkinson that we have rescheduled his presentation until after lunch because we have a cancellation to the presenters this afternoon.

Unfortunately, neither of the utilities are going to be able to join us for a variety of reasons, so I'd like to propose a break here for lunch until 1:30 and then we will pick up with a presentation by Dr. Wilkinson and Dr. Wolff.

(Whereupon, at 12:08 p.m., the workshop was adjourned , to reconvene at 1:30 p.m. this same day.)

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AFTERNOON SESSION

1:36 p.m.

MR. TRASK: First of all, I would like to correct myself. I had stated before the break that we wouldn't have any presentations from the utilities, but I am very pleased to change my story on that one, and we will have a couple of people here from PG & E to speak in a little bit.

First, we are going to get going with Dr. Gary Wolff who is with the Pacific Institute, and he is doing a separate study with Dr. Bob Wilkinson here from UC Santa Barbara trying to really nail down the exact energy use related to water throughout the entire state.

They are doing a study through our public interest energy research and are here to update us on the study and let us know where they are.

MR. WOLFF: For those who are still a little bit asleep from lunch, this here -- how do you make this pointer work, (inaudible). The good thing about it, is that the energy issues are very simple and understandable, right?

Today's presentation is just two things that I will present, but my partner in crime, Dr.

Bob Wilkinson will be here for the presentation afterwards for any questions or any discussion later in the day because the first item is feedback on the categories to be used in our analysis called Preliminary Analysis Statewide Water Sector Energy Use, and we want feedback on that, in particular what is missing from the categories, or what should be added to the categories, and are the categories adequate for later policy discussions.

So, this presentation is a way of soliciting feedback, and we don't have time for it in the Q and A, please come up to me afterwards or to Bob afterwards or send us an e-mail or something.

Then secondly, I am going to give a short example showing the importance of simultaneous accounting of water energy and regulatory proceedings. These two topics are not connected to one another. They are just two different topics that came up in the course of the task force workshops that I was asked to present a little information on today.

Our project simplified is to estimate statewide energy use in water management, and I would really like to figure out how to make this pointer work. I've got it. All we are going to do is we are going to have a bunch of categories which I am going to walk you through with respect to the entire water systems of the State of California.

For each one of them, we are going to put annual water use numbers for the year 2000 against it, and then an annual energy use in the year 2000 against that category, and the sum of the categories will give us a statewide number. This is a very crude number now 46,000 GWhs, equivalent GWhs which is to say that they are not all electricity. Some of them are natural gas or diesel, or whatever that had been converted to KWhs.

This is a very simple methodology. We want feedback on the beginning is whether these categories are the right categories.

We start with five high level groups of categories, sources of conveyance, water treatment, distribution, customer use, waste water collection and treatment, and I am going to break each of these down as I go through the presentation.

I should point out that in agriculture for example, there isn't water treatment, we go directly from source to conveyance to distribution. So, the boundary between let's say a state project or a federal project and a local irrigation district occurs right around here.

By customer use, we mean in the agriculture setting, we mean on farm use as separate from use by the irrigation district. Of course, we don't have waste water collection and treatment on farms, we do have drainage management, so that is what would go here for agriculture use.

Sources of conveyance. The largest category is imported water, large inter basin transfers, and we have local surface water, or we have reservoir category, and a run of the river category.

Reservoir is typically the water is gravity fed from the reservoir to wherever it is going. Run of the river, there might be a lift out of the river.

Local ground water, we can differentiate that into categories of various depths to water. Recycled waste water is treated as a source, and the energy use for recycled waste water is just the energy used to upgrade water from a discharge standard to a use standard, and desalination which can be broken down into sea water and brackish.

Each of these is sort of in parallel. These are parallel categories, different pathways for water to come to a treatment facility.

Bank groundwater is additive to these, not in parallel, so you might bring imported water to some place, put it in the ground, and then bring it up out of the ground later. So, this and this would be then be additive for that amount of water that was flowing through the system.

In water treatment, we won't have sub categories. First we will have a preliminary estimate based on average energy use from existing studies. Then we will have a later estimate based on a survey that identifies the distribution of energy use.

For example, ten percent of plants might use 100 KWh per acre foot, 20 percent might use 200 KWh per acre foot and so forth. The studies that we have now, if we knew those studies were representative, we wouldn't need to do a survey later, but we really don't know that the sample of studies that we've got are representative of the population of systems out there.

Our first number that we will be releasing at the end of May are Phase 1 number we based on existing studies. Later on, we have to refine that through some sort of survey.

Distribution similarly, no sub categories, the first, just a preliminary estimate based on average, and later on, some sort of estimate based on survey data. We will break out pressurization at the treatment plant. That is one place where energy gets used, and that energy usually shows up on the bills for the treatment plant, and then supplemental pop stations in the network, these are different electric meters in the system, so you have a different separate accounting for that.

This pressurization, the tree and plant, it often gets intermixed with the energy actually used in the treatment plant for treatment, and we have to separate that out for policy purposes later on.

Customer use, we can break into these five groups of customers, and then within each of these, there is a big breakdown.

Waste water collection and treatment, again, no sub categories at first, preliminary estimate based on average. Later estimate based on survey data broken down into use and collection pump stations. These are lift stations in the sewage system. Energy used at the treatment plant and energy used for outfall pressurization.

Outfall pressurization can vary enormously from system to system, even though the energy used in the plant itself might be quite similar from the cross systems.

Here is where I want to use this electronic mouse. This thing has no cord. If it had a cord, I would just rip it out right now. What I am supposed to be able to do is use the hypo links in this. The link is up here, well you can't see that.

Okay, here we go. I am going to show you the break downs now. Sources and conveyance, you have seen this slide, now here is the breakdown of imported water, and these are the eight large inter based and transfer water projects in the state. These last five actually produce more energy than they use. Nonetheless, we are gathering that data just as a comprehensive data set.

The Central Valley Project does produce electricity than it uses, but the production part of the system and the use part of the system are separable in terms of system making. You could produce a lot of power out of the Central Valley Project and let all that water run to the sea and never use it. From a policy perspective, we will separate those out.

Going back up the hierarchy and water treatment of a breakdown which you've seen, distribution you've seen, customer use, there were these five, drill down into residential. Here we are.

These are the residential indoor customer uses. The plumbing system itself can use water and energy, water softeners and water filters, these are separate categories, the colon is a category separator, toilets, clothes washers, dishwashers, showers, faucets, baths, broken down into standard and jacuzzi tubs. I have no idea how much energy is used in jacuzzi tubs in California.

Refrigerators, because they often deliver chilled water in the front of the door, right, and freezers that produce ice. Sub pumps for storm or groundwater that takes place at a home and typically indoor to keep the water from being indoors. In some cases, and especially in outlying areas, on sight water supply and on sight sewage treatment. Those are my categories for indoor residential.

Commercial, institutional, and industrial indoor. All the categories in residential indoor use. Highrise supplemental (indiscernible) because in high rise buildings, the distribution system pressure often isn't enough to get the water up high.

Research wedding hot water loops as in large commercial buildings. Pre rinse nozzles, steam ovens and tables, car and truck washers, water brooms, process hot water and steam, process chilling, equipment cooling like x-ray machines, cooling towers, which we use to supplement the cooling system for the building itself, and then on sight treatment, both before and after use.

Often we have water being treated above a potable standard in certain type of industrial facilities like a fabrication plant, chip fabrication plant.

This is an area I'd really love feedback on whether there is any important categories we are missing. No one has ever tried to do this before to categorize the water use into enough categories to capture all the different energy water linkages NCII, especially in industrial where there is a huge amount of heterogeneity.

MR. TRASK: Gary, if I might interrupt you there. One that occurs to me is well, for instance in the food industry, just the water that goes into the food, the same thing in the petroleum industry and refineries, a lot of water is put into the process. I think there are quite a few processes like that where just the process itself takes water.

MR. WOLFF: I do have process hot water and steam and process chilling. You are thinking of the water that goes into the produce in some way?

MR. TRASK: Right.

MR. WOLFF: Okay. I'll think about that. Thank you. Residential outdoor broken down into pressurized landscape irrigation. The irrigation controllers and valves. I don't think this is going to be much, but it is worth thinking about. You know, they are electronic, they use electricity. It might be a surprisingly big number like all of the little electric uses used to keep your TV ready to flash on instantly. It turns out that is a lot of energy use nationwide. I don't know what irrigation controllers and valves -- the valves don't use anything, but I don't know what the controllers use in standby. And then pools and hot tubs.

Commercial and institutional -- oh no, this is the same slide. I've got them all lumped together. Then agricultural broken down into: Flood irrigation, where there is no lift at the farm, so there is no supplemental energy use on the farm; Flood irrigation where there is a lift at the farm, the lifted out of the ditch at the side of the field; Pressurized irrigation, spray or drip; Tail water reuse where the water is pumped back up to the front of the farm, the upper side of the farm from the lower end of the farm.

Again, we will do a preliminary estimate based on average numbers that we have in various studies now. I had a question mark on this, a later estimate based on survey data wondering whether it was necessary to do a survey or not. I think some of the discussion before lunch suggests that maybe some sort of supplemental survey would be useful, but we will follow up with all the ag people that were here this morning about that, what their opinion is about the usefulness or how we should focus on this is Phase 2.

That completes customer use. I only have waste water collection and treatment, no sub categories at first, you saw this earlier.

Part two, the second part of the presentation. An example showing the importance of simultaneous accounting of water and energy and regulatory proceedings. This came up in the last workshop meeting where someone mentioned that the PUC is going to be authorizing a lot of spending by utilities in 2006 and beyond for energy conservation, and that person was concerned that the methods for determining what is cost effective under the regulatory rules won't be adequate to account for water energy linkages.

I chimed in and said that might be the case. I can provide an example of how it is useful of how you can go wrong, and they asked me to, so that is what I am going to do is provide an example of how not to blow your foot off through being puzzled and not paying enough attention to how you are doing the analysis.

This is the last slide. Efficient clothes washers. We know that they are cost effective to adopt, I mean the Energy Commission has adopted an appliance standard for that reason, but this is a good analysis to show how doing your analysis separately between water and energy can lead you astray.

So if I look at just saving water from a more efficient clothes washer and ignore the energy benefit, I would get a levelized cost estimate under these assumptions here which are very simple of $3.61 per hundred cubic foot of water conserved.

If I compare that against a comparable utility price in an urban setting of $1.75 per hundred cubic foot purchased, it doesn't look desirable. It cost way too much to conserve that water versus purchasing the water, I should just purchase the water, forget that conservation program.

Similarly, if I look at natural gas energy used to heat water used in clothes washers and I ignore the water savings, I get a $1.07 per therm conserved, and I can buy that therm for about $ .85. So, again, it doesn't look desirable.

If I combine this benefits in the analysis, which is the right way to do it, I find that either I am saving water at $ .75 per hundred cubic foot, which is cheaper than the water purchase price, or I am saving energy at $ .55 per therm which is cheaper than the purchase price -- oh, that is a typo, this should be $ .85 just like that.

Either way I look at it, and these are like opposite sides of the coin, they are just different ways of calculating the same number. Either way I look at it, it makes sense. It is worth doing.

If you combine the water energy benefits for a decision as to whether we should have a more efficient clothes washer standard or not, you get an unequivocal answer, yes. If you look at it in an individual way, you get an unequivocal answer of no. It is just a very simple example of why we need to be sure that in the PUC proceedings that are coming up, they do address the water energy linkages, other linkages like this of looking at both types of resources or multiple types of resources that can be conserved along with energy, not just energy alone.

That is the presentation. Any feedback on the categories other than the things that people threw up during the presentation?

MS. DAVIS: Just one. Martha Davis with the N 1 Empire Utilities Agency. Just as you were looking at your groundwater, just remember in your groundwater management programs, there are opportunities for what's called "in lieu recharge" --

MR. WOLFF: Yeah.

MS. DAVIS: -- where you are not moving water, it is a paper category, and that is one of the places where as you are doing a comprehensive analysis of the electrons, it is one of the places where you pick up the biggest benefits.

MR. WOLFF: Right. Let me point out that here are the categories that we will be using, and this will be a one time snapshot of energy use in water management in the year 2000 in California.

The analysis that you are talking about is sort of considering options now. You know, what can we do about it from a policy perspective. We are not doing that work. That is not our project, but I need to be sure the categories are set up so that they are useful for later policy discussions.

The question you are raising is are these categories going to be adequate to pick up that issue later on. I'll think about that. I think they are, but I'll think about that. I just wanted to point that out for everyone, though, that is the question you are being asked. Are these categories adequate for any or every policy idea that you might want to see explored later on. Ronnie, I know you had a question. No?

MR. TRASK: Gary, what about the losses. Are you going to put all the losses in all the categories, or are you going to have an energy factor associated with losses?

MR. WOLFF: The way it works is in each category, you have a quantity of water. So, at the aggregate level of the total quantity for each of these boxes, for example, you will have a quantity here and a quantity here and a quantity here and a quantity here. They will be going down as you go through the system.

The loss is implicitly the difference from one to the next. So, in all the categories that can be set up in a series and for example, an indoor residential, the plumbing system is always in series with any appliance. If there is a loss in there, it will show up as the difference in the quantity of water in those two boxes that are in series.

MR. KLEIN: It may be useful to actually categorize the losses and aggregate them at some point. Clearly losses are something we could afford to get rid of. Keeping them as a category at each step in the process, you've got those arrows, wherever those arrows are in the drawing represents -- I realize it is implied in the numbers, you might just want to make sure you pull it out and keep it accounted somewhere else.

MR. WOLFF: There is actually -- that is a really good point, and there is a sub point buried in there which is what I am calling losses includes losses that can be prevented as you've just said. There are also some losses that can't be prevented, and so we should separate them out.

Going from customer use to waste water, all consumptive use will show up here as a loss, but we are not going to try to prevent consumptive use, at least efficient consumptive use. You drink some water, you know. You make some ice in your ice maker, you know, we are not going to try to change that.

I need to separate those things out.

MR. TRASK: My thought would be sort of bang for the buck. Where should we put most of our emphasis on trying to reduce losses, where would that have the most effect on energy.

MR. WOLFF: That is an excellent point.

MR. KLEIN: I actually have another question.

MR. WILKINSON: I'll just tag on one comment on that. I think this is a very important point both in the first stage there and probably the third distribution losses within municipal systems for example and some agriculture systems can be large.

There are things we could do that would cut those down. That would save a lot of energy, and most people don't think about it that way. So, I think that is a good point. We will do that.

MR. KLEIN: Thank you. I have a

question about the graph that's showing right now, the graph up, but you asked if we had any other categories. One of the categories the Commission used to track, we may still do is water beds.

MR. WOLFF: Yeah.

MR. KLEIN: It didn't show up in your residential ones and I'm not sure it should, but I'm just commenting that --

MR. TRASK: No, that is storage.

MR. KLEIN: Oh, okay, but we do track it.

MR. TRASK: Emergency storage.

MR. KLEIN: Only state in the union that does, but we do.

MR. WILKINSON: I thought we got the government out of people's bedrooms.

MR. WOLFF: You know, when I was up here maybe a month ago, I had a talk with your staff because you actually had the energy numbers for that. They said that has kind of become a joke internally.

MR. KLEIN: As I said, I'm not sure we still do. The other one, can you go to the process heating under the next one, commercial.

MR. WOLFF: Commercial process.

MR. KLEIN: One of the things to observe, I'm not sure how you are calculating it, you've identified slightly above recirculating hot water loops. Those exist in residential as well as commercial, but they are no where near as prevalent or as big.

Under the process water and steam, there is actually another loop there. I'm not sure how your accounting for it, you may just think of it as the same thing, but between a boiler and a tank that is providing domestic water for a big building, there is a separate loop. That loop is controllable separately from the boiler itself. You can in fact change the temperature of that loop over time during a day based on demands and have 20 or 30 percent energy savings in the building.

MR. WOLFF: You are talking about the loop between the boiler and the hot water heater, you --

MR. KLEIN: (Indiscernible).

MR. WOLFF: -- (indiscernible) boiler for a lower grade heat?

MR. KLEIN: Not exactly. There is a boiler to heat domestic water, and there is a tank to store it, so you can take care of really big peaks like 6:00 in the morning when everyone gets up at the hotel.

MR. WOLFF: Yeah.

MR. KLEIN: That relationship is usually a loop with a pump in it, and that is a separate control point.

MR. WOLFF: That is a good point. That is also true for cold water too. There are cold water tanks that are used, chilled water tanks that are used.

MR. KLEIN: One additional level of separation might actually provide some value for future change.

MR. WOLFF: It is a good point.

MR. KLEIN: Oh, I did have one question about that graphic, can we go back to that. My apologies.

MR. WOLFF: Sure, the green box graph.

MR. KLEIN: I want to know what the curved line going back from waste water treatment of customer uses. We didn't talk --

MR. WOLFF: That is water reclamation, water recycling, just showing that it is not a once through system necessarily starting here and ending here, but there is some recycling. Now there is also some internal reuse that goes on here, but that was too complicated to show.

This is just a water recycling system.

MR. KLEIN: Isn't that really -- water recycling if it is done at a city level, sort of looks like a new source if you will and goes back to the big picture.

MR. WOLFF: Yes.

MR. KLEIN: As opposed to directly back to the consumer.

MR. WOLFF: In our accounting, it shows up as a sub category here. There is a recycled waste water.

MR. KLEIN: Thank you.

MR. WOLFF: It shows up as a category there, but in terms of the physical plumbing, it doesn't actually come back through the water treatment and distribution system, it has its own distribution system, usually. Usually it is in use for landscape irrigation or some particular industrial use, and it has got its own pipe directly back to those customers. It is a parallel pipe if you will.

MR. KLEIN: Right, thank you.

MR. WOLFF: Sure.

MR. WILKINSON: I had a question I wanted to ask the assembled group and maybe those in the e through here on water quality considerations.

I will take one of Martha's sources as an example. Groundwater desalination, this is brackish water desalination that is pumped out of the ground, treated with RO, and then provided as a high quality municipal supply. In fact, the quality is higher than many of the other sources of water because it has been treated.

How do we handle, if at all, the quality variability in this dimension because quality counts for something that has value, and there is an applied energy piece in this, and it is an interesting puzzle for us.

So, is there any thoughts or guidance for us on that? If you have thoughts and don't think of them now, please send them.

MR. SIENKIEWICH: Andy Sienkiewich, Metropolitan Water. We are providing incentives for about twenty groundwater, brackish water projects. Most of the projects are built on a principle of blending.

In other words, for all the high quality water that goes out, they don't treat all of that, it is usually about two-thirds to a third, so they blend untreated water with highly treated water, and that is how you regulate the quality.

The quality is really aimed at what the distribution system needs. So, I am not sure if that helps, but that's the practice.

MR. WILKINSON: Yes, it does. That does help.

MR. WOLFF: Let me just repeat a point that Bob made, and I made at the beginning which is that feedback is welcome any time in the future, but sooner is better than later, the next couple of weeks would be ideal. Thanks very much.

MR. TRASK: All right, thanks, Gary. Folks that don't have either Gary or Bob's e-mail address, you can also send it to me. My e-mail address will be at the end of my presentation which is coming up here in a little bit.

MR. WOLFF: Matt, the presentation is going to be available, right?

MR. TRASK: Yes.

MR. WOLFF: On the website?

MR. TRASK: Right.

MR. WOLFF: So, our e-mail address is on the first two slides of the presentation.

MR. TRASK: I believe yours is already up on the website, but I am not sure about that.

In the interest of time, I was going to start our afternoon session with a short presentation, just sort of some of the analysis that we've done on the urban side, however, some of our utility people have some pretty tight schedules and have to leave here at 2:30.

I think I will go ahead and hand it over to Pete Turnbull and Corey Meyers of PG & E to talk a little bit about their rate structures and conservation program.

MR. MEYERS: Thank you, we did make it. My name is Corey Meyers, I am the Manager of Electric Tariffs at PG & E.

I didn't do anything or bring anything in the way of a formal presentation, I just wanted to say a few things about where we are in the way of rate design, some of the opportunities we have in demand response, and maybe some of the other programs that we have that might be interesting to you. I know Pete is going to talk about some of the CE stuff in particular.

First of all, rate design, right now PG & E is going through its Phase 2 of its general rate case, and there are a few things that are in that Phase 2 that will probably interest you, particularly the ag customers.

One of the things that we are proposing is to eliminate the ratchets, the demand rachets, twelve month rachets which should make most of you happy.

Another thing that we are looking at which is a little more contentious is trying to streamline the number of ag rates that we have. Currently we have six ag rates, we are trying to move it down to two, a time use and a non-time use rate.

We know there are also some issues with definition that we have been struggling with the last several years, and we are trying to move to a simpler definition of ag.

On the other hand, we know that there are a lot of customers out there that have been taking advantage of the ag rates for many years, and it is a very valuable asset to them, the ag rates. So, we would be grandfathering in the existing customers in the ag rates until such time as there is a change of party, you sell your business or whatever.

Those are kind of some of things that are happening on the ag side. The commercial rate structure and investor rate structure isn't really going to change that much in our Phase 2, so you shouldn't see too much in the way there.

I wanted to talk to you also about demand response, which is probably of great interest to many of you. I know Lon is going to talk a little about some things later on that are going on with the water agencies, but the CPUC ordered at the beginning of this year that all customers greater than 200 KW have interminable meters be put in place.

We have been moving in that direction, and if you don't already have an interminable meter, you will soon get one. The thing about the interminable meters is not only it can tell you on an hourly basis what your usage is, you can also get that data the next day.

We do upload the information daily from the meters. We do post it on the web. We can give you a password, and you can look at your data. You can manipulate your data, do some what ifs with the data. If I would have dropped a load here, what would the effect of that be. So, it is a nice tool.

We should have all of those meters or a lot of those meters in place by June 1. It might be a little slower getting meters in place where there is no RF coverage or no cell phone coverage and no phone lines. It makes it a little more difficult to get those meters in place.

We do have three demand response programs that can be utilized with these meters. The first is a CPA program that CPA created which is called Demand Response Program which provides capacity and energy payments for a day ahead bidding into our system for bidding into load reduction.

All these programs what I am talking about right now are voluntary programs. The second one is a demand bid program which provides interestingly enough, we would call it when power reaches eight cents a KW hour, but we would pay you about eight cents plus ten cents, so give you a ten cent adder on whatever that market price is.

The idea behind this is we weren't getting a whole lot of customers that we participating in the demand bid program based on market prices. The market prices really aren't that steep right now, and they don't show that much volatility, and we are trying to get a feel for what price elasticity actually is and what levels customers are willing to curtail given those prices. That is a very good program to make some money if you actually do have load that you can curtail given a day's notice.

The last program that I want to talk about is the Critical Peak Pricing Program. We do have a voluntary program right now which -- the Critical Peak Pricing Program is essentially a program where you see for instance twelve times a year you would see a critical peak price, or you would be exposed to a super peak type rate, which is in our situation five times what your normal on peak power rate is.

You would have an opportunity to save money, if you can reduce load during that time because your other time of use, your partial peak, and your off peak are discounted a little bit. So, it is a revenue neutral rate, but you do have a greater opportunity to reduce and lower your bill.

What has caused a great deal of concern and consternation and whatever else in the market for everybody was an order by the Commission that came out earlier this year on the 20th of January, well, the 20th of January we were ordered to file mandatory critical peak pricing rates or default rates, where all customers greater than 200 KW would be required to be on a critical peak pricing rate.

Just so you know, the Commission has a draft decision or a proposed decision out which delays this rate for a year at least. They are trying to put actually the creation of this rate into our Phase 2 of our general rate case, which is another problem, but that is a different story. It certainly appears to be the direction that the CPUC is going.

Our proposal as we did file it in January was to have the critical peak pricing rate apply only to customers between 200 and 500 KW and only on the E 19 V -- or on the ATN rates. Ag customers were not included into our proposal and neither were direct access customers.

As an option, customers could opt out of that critical peak pricing rate, but they would have to pay a premium. That is pretty consistent with all the utilities have a little different take on it, but there is an option for most utilities of applying for that rate.

The last thing I wanted to say is on our some of our technical assistance incentive programs. One of the good things that came out of our demand response decision is we've got I would say the ability to provide some pretty good incentives for demand response and installation of demand response equipment and for the survey for the demand response activities.

In particular, we will give $50 per KW identified in audits, peak load reduction and $100 per KW actual peak load reduction in the way of rebating towards an incentive towards the installation of equipment.

We are trying to get the program up and running at this point. We are having some glitches trying to get it all in place, but we hope to get it in place soon, and you know, certainly it is approved. It is just a matter of trying to get the infrastructures in place to make sure everybody gets paid.

The last thing I wanted to talk about

was our Ag Ice Program and for you ag customers, the ICE stands for Internal Combustion Engines. What it is, is a program where we try to incent diesel engines to convert over to electricity.

The particular program is in settlements right now, and it is going through the last part of its hearings right now at the Commission, so we can't say too much to it, but generally speaking as all of California, it is to try to help clean the air, and it is part of the clean air initiative.

We would provide ag customers that convert with an electric rate, at least initially, an electric rate which is comparable to your diesel fuel class, and the electric rate does increase a little bit over several years to where it gets to a normal rate, but there is some initial incentive by a lower rate.

We also have some concessions in the way of our line extension costs which would make it more I guess feasible and favorable for you to actually rearrange facilities and convert to electric or extend the electric line out to your pumps.

Those are the types of things that we

are working on right now, and if there are any questions generally for me or PG & E or any of these questions.

MR. KLEIN: I have a question related to the last program you just mentioned. I don't know if you were here for the morning discussion, were you able to listen in this morning?

MR. MEYER: No, I wasn't.

MR. KLEIN: One of the questions that we raised had to do with connecting this effort of the conversion to efficient utilization of the pumps and the well, checking to see that the overall efficiency of this conversion is good as well as just converting to electric. How are you tying this conversion to the existing pump testing programs that are out there to help make sure that the new conversion is as efficient as it could be.

I know you have efficient motor programs and other activities, so I am wondering how you are trying to link them.

MR. MEYER: Again, it is kind of part of the settlement itself, but certainly we are trying to make sure that whatever is installed out there is the most efficient piece of equipment possible.

I don't know frankly if there any

minimal requirements for the pumps, but certainly that would be something that we would be looking at. I could certainly find out for you too.

MR. KLEIN: It would probably be a really useful thing, and I would appreciate learning more.

MR. MEYER: Sure.

MR. KLEIN: I know at least one or two of the water districts I've spoken with would be really interested in collaborating with your utility to make sure that the offerings of both sides of the house, the efficiency side and this Ice Program, are coordinated and you might want to think about how to implement that.

MR. MEYER: I think it makes absolute sense. Thank you for your suggestion. I'll get back to you on that.

MR. KAUT: Stan Kaut with the Santa Clara Valley Water District. I have a couple of questions. In regard to the Critical Peak Power Program, is there going to be any exclusions for those of us that have processes that interrupting those during critical times like slowing them down and shutting them down and then starting them up again and all the inefficiencies? We treat water

24/7. If during the hottest part of the day and everything, we all of the sudden get hit with a big cost, that is going to have to be passed on to our customers, and our only alternative is to get storage that we don't have right now.

I guess I could see two solutions, one would be is there going to be some warning where you can cut back at a critical time to avoid this?

MR. MEYER: Okay, to answer that question, you would be given a day's advance notice.

MR. KAUT: A day advance?

MR. MEYER: Yes.

MR. KAUT: Then is there going to be any exemptions to water agencies or anybody that has a public process should the public do it?

MR. MEYER: This is all part of the decision process with the Commission. I don't think as it is visualized now by the Commission that there would be any exemptions. Again, our proposal -- during our proposal, we tried to minimize the amount of customers that would be affected, between 200 and 500 KW.

We are trying to go after the air conditioning load, not the process load because we understand that in your situation as well as in a situations for many large manufacturing companies, that they don't have the ability to curtail.

We haven't been successful yet in getting those types of exemptions, but again, we are going to go through -- we just finished a proceeding, we are going to be going through another proceeding very shortly to address those issues, but that is certainly a valid point.

MR. KAUT: I guess related to that is my second question. It is a two part. Is there any discussion that has been going on about allowing us to use their diesel generators to provide our own power during those critical periods of time rather than going ahead and being penalized?

MR. MEYER: We have tried to in fact, in the last filing that we had made, we had tried to have a clean diesel program that would allow and actually incent customers such as yourself to -- and pay for much of the retrofit costs to make those diesel generators clean so you could in fact do exactly what you are talking about.

The judge denied our application for that program, and basically the thought was that diesel generation or any generation really wasn't part of the demand response element, so we had tried to do exactly what you are suggesting. In fact, to lock it into the clean air initiative and everything else because what the cost of the retrofit would clean up diesel generation testing and everything else, but we were unsuccessful in doing so.

I don't believe that we have any intention of filing it June 1, which is our next filing, but we may look at it later on.

MR. KAUT: The last comment is related to the diesels again. The first year that we were allowed to curtail power around the energy crisis, we were able to upgrade our diesels, and we were able to take the load off the grid, so it is not accurate statement saying that they don't contribute to that, and it seems like for the short period of time during an emergency during that we get into these situations. It would be a lot of value to use all of this infrastructure that is already there and somebody ought to do an analysis compared to what the environmental impacts would be versus the other impacts on our state.

Is there anything going on with PG & E

to support that?

MR. MEYER: Again, we've just kind of gone down that path and got told that wasn't the path to go down to. We actually as you said, didn't use to allow diesel generation as part of our non firm programs. The Commission decided that wasn't appropriate because of the emissions, and they made a social decision.

MR. KAUT: When you are saying Commission, which Commission?

MR. MEYER: California Public Utilities Commission not this commission.

MR. KAUT: Thank you for listening to the comments.

MR. TRASK: Cory, I had a quick question. Has PG & E done any analysis or will you do analysis that the effect on demand of your electrification program?

MR. MEYER: On the effect of demand?

MR. TRASK: Electric demand.

MR. MEYER: Yes, certainly. It is part of the M & E measurement and evaluation piece.

MR. TRASK: You have done it or you will do it.

MR. MEYER: We haven't. We will measure

it as it is in place and see if (indiscernible).

MR. TRASK: Any other questions?

MR. TURNBULL: Hi, I'm Peter Turnbull with PG & E, and I work in our energy efficiency group. I'm not an ag specialist, so I really don't have a lot to add to what Pete Canessa and Gary Kah and Dan Howes said this morning.

I think generally I confirm most or all of what I heard from them. I think more generally in energy efficiency, it has been alluded to a couple of times, our portfolios are under kind of review and construction right now. So, what we will offer starting in '06 through '08 is under consideration right now.

Generally speaking, we are looking for any and all cost effective energy efficiency and that is what we will pursue. The goals are bigger. The funding didn't get as much bigger as the goals, however, so that drives us in the area of getting more energy for less money on a unit basis with those programs. That is something that is a constraint that we are working with.

We are very interested in the synergies that Mr. Wolff talked about on the clothes washer. Another one that is a little bit similar to that are the pre-rinse nozzles for restaurants another real good one.

We knew about the washing machines, the nozzles kind of got right in under the radar on us until about the last four or five years, so we didn't really know about that one right away. We didn't know that there was a way to clean the plates with 1/4 the water so to speak.

If there are more of those, that would be great, it would be terrific, and we would be very eager to hear about that.

Maybe my last point here is simply that we will be looking to be as integrated as possible in our demand response programs, our energy efficiency programs and our generation programs. That perhaps seems obvious to the audience, and it should be. It is an obvious thing.

The way the proceedings work before the Public Utilities Commission they have separate funding streams and there are separate proceedings, and you say you want to do "X" and such in one program area, you need to do it, and so on in another. That does get -- we are very much trying to bring that together, so we will try to be as integrated as possible going forward so that the demand response, the energy efficiency, and then the generation issues will brought together. That is what we are attempting to do.

That is what I will say really. If anybody has any questions, I will do my best.

MR. YARISH: My name is tom Yarish, I do environmental work in Marin and Sonoma counties. I am also a retired electrical contractor.

I had to wonder under efficiency if your calculations and audits include such things as power factor correction, ground faults, ground fault losses through on site pumps that are in some phase of failure and may have significant electrical leakage.

As a contractor, I was aware that the quality of PG & E power was declining and realized in such things as power factor issues and phase and balances, that were almost impossible to reconcile and deal with in the field.

I would expect that would be a component of your energy efficiency measures. Thank you.

MR. TURNBULL: Is Gary Kah still here? I guess not. You are in an area that's beyond my expertise. I simply don't know what they do there in terms of any kind of pumping. The power factor does get corrected on the system level. We do look at that analysis of when we do energy audits of facilities typically.

We try to account for that. You listed a number of other things. I am not really sure how those are handled, I don't know -- maybe Pete Canessa knows.

MR. CANESSA: This is Pete Canessa: As far as our pump efficiency tests, our guys are probably not doing what you say. I think the Southern California Edision takes a little bit more comprehensive approach, but they are an municipal account also.

When PG & E or one of their contractors does an industrial facility audit, if they are going to go to winery or something like that, they are looking at all that. Now, I'm not sure what the utility is supplying, but they are going to go measure and see if there is a problem.

When we were running the Ag Peak Load Reduction Program, we did a lot of -- well, not a lot, but we did more than a few projects where we were putting in power factor corrections and stuff like that to save energy.

MR. KLEIN: It needs to be done at the

local level (inaudible) --

MR. CANESSA: Right. It is a particular problem. I mean I worked at a large farm, superior farm, and we were out in the middle of Kern County, and yeah, we dropped 50 pumps at a time off the line because there was a surge come through, so I --

MR. TURNBULL: The power factor is in the tariffs for the larger customers, right? So, it is for the larger customers that is measured, and it is what .85 above that it is a bonus, below that it is a penalty, but that is for large customers.

MS. COHEN: I am Ronnie Cohen with NRDC. You mentioned the clothes washers and the pre-rinse spray valves. I am wondering if you are also looking at changes that can save water, not necessarily end use energy, but things like landscape that can reduce peak energy use that we talked about at other points of this process or other cold water savings as well that can help reduce energy use, even if it is not end use energy, but still save energy at other points in the water use cycle?

MR. TURNBULL: I'm not specifically

aware of something in that category, but we are open to any and all things that would be cost effective there. I don't know that the list of things is going to be real long, such as what we heard earlier, the washers and the spray nozzles. If it is there, we are open to considering that.

It is paid for with electric public goods charge of course or gas, and it has to be cost effective on that basis for us to fund it. If you have examples, you know, we are in contact with your office a lot, and we would love to hear that.

MS. COHEN: Okay, great, thanks.

MR. TRASK: I will comment. One of things that I came across in my study is that when audits of large turf irrigations were done, they were finding on average that they were watering about twice as much as they needed to.

MR. WOLFF: This is Gary Wolff. I just wanted to comment about the point you made about please provide you with any other ideas of where energy and water can be saved together, and I will be glad to do that separately from this meeting.

I just wanted to enter into the record the concern of that offer, that generous offer on your part, raises in my mind, which is that you know, we need to be in a position where our planners are routinely thinking about the energy dimension of the water management issue.

Sometimes there won't be a significant energy dimension, sometimes there will be, they need to be thinking about it. Energy planners similarly need to be thinking about it. Even though I can provide you the knowledge that I have today and you can make use of that and that is great, we need to systematically change the system also, though, so it doesn't depend on one off conversations like that, but that from a planning perspective, there is integrated planning.

MR. TURNBULL: For the record, nodding and smiling on our part on that.

MR. YARISH: Tom Yarish again on somewhat different issue. My brother is the Northern District Manager for United Green Tech who sells very highly sophisticated evapotranspiration irrigation equipment to cities, municipalities, institutions, and school districts, and I believe some small scale users.

I don't know, and I don't know if he knows what the energy savings are related to this evapotransperation systems that are extremely efficient in monitoring water on a day to day basis, but I have seen a large institutional resistance to go to these kinds of measures, possibly because they don't understand where they save money on irrigation, they will also save money on electricity directly or indirectly.

Is there any unified effort to bring all of these institutional users on board with these systems?

MR. TURNBULL: We are real interested in hearing more about that technology. I'm serious about that, like (indiscernible), we have programs to evaluate that. I think efforts like this are probably the beginning of some institutional efforts to bring these things together. I think I would answer that way.

MR. KLEIN: Can I ask a question about time frame on this for you? I understand that you are in the process of putting together plans for the next several years, right? What is the timing on that?

MR. TURNBULL: I believe our timing is to file the programs in June, I believe it is June 1. That is what I believe to be the case. I think that those are going to be at a relatively high level, so that there will be flexibility down the road to make corrections or additions to the programs, but at a high level, we will be saying here's the direction we want to go in June.

MR. KLEIN: I've been speaking with a couple of the folks on the statewide pag for that question, and so we have some ideas to share with you, if we can chat before the end of the day, that would be great.

MR. TURNBULL: Sure.

MR. TRASK: Any other questions or comments for PG & E?

COMMISSIONER BOYD: Your time budget is suffering, Matt.

MR. TRASK: My agenda. Yes, we are running behind here. I think we will just forgo my presentation. I don't think it would have added a lot of value to this afternoon's discussion, so I think we will go right away to Andy Sienkiewich who is with the Metropolitan Water District. Andy I am sure will be able to tell you a lot more about what Metropolitan does than I do, but just for the record, it is a very large wholesale water agency with something like

29 customers, is that correct?
MR. SIENKIEWICH: 26.
MR. TRASK: 26, excuse me, serving the vast majority of the Los Angeles area.
MR. SIENKIEWICH: Thanks, Matt. We appreciate the opportunity to be here. We have been working with Matt and are very interested in this energy water relationship.
I am a little fearful I may have too many slides, but I'm going to try to run through this, and I will try to do it fast.
My objective was to explain who we are, we are a water agency and what we do. Our energy relationships to address our efficiency ethic and programs, and speak about partnering opportunities, and perhaps in that last point, maybe I will just start out to say that we are very interested with business cases there to link up the energies and the resources of different disciplines to reach a common goal.
At least in our area, we see common benefits arriving from efficiency programs in water supply, those benefits could also benefit sanitation districts. Energy benefits, both gas and electric perhaps even solid waste disposal and

certainly are a potential benefits to receiving waters.

We are a large water wholesaler is the term. We provide about 60 percent of the water to about 18 million residents in Southern California. The region as a whole requires about 4 MAF. That acre foot term, one acre foot is about good for about two households worth of water in a year. You are familiar with that.

Our primary source is to Colorado River running from east to west. We are also a contractor with the state water project, the largest contractor with the state, and we bring water down into our service area.

All of our customers are public agencies. We do not have any retail customers. So, all of our relationships and everything we do are predicated on that set up.

Our customers are public agencies, and for instance, the City of Los Angeles, one of our customers, owns the LA Aqueduct, and in a year like this was a very wet year, they are going to be taking more water from the aqueduct in their aqueduct and less from us. Our demands will move up and down as a supplemental supplier to the basic supplies that these local customers.

I would just like to point out some of the challenges we have in meeting water supply. Two years ago we had the driest year in 126 years of record. Right now, this year, we are almost up to the wettest year in that record, we are just a shade short of that.

To meet water supply, you really have to have storage programs to get through winter to summer programs and wet years to dry years. Of course when we conserve water in a wet year like this year, we are allowing more water to be saved in storage so it can help us in that dry year.

Of course in that dry year, as well, that conservation is a resource we count on to meet our supply activities.

Similarly when we are doing recycling, we are recycling stored water, and we are saving it for times when it is needed.

Just to give you an example of some of the circumstances we are in. A one year difference in Lake Powell, that lake now is approximately 140 mile long reservoir that is 150 feet down, we are dealing with a severe drought, and finally we are getting some rain to help turn things around fortunately for us.

Similarly to energy strategies, we have adopted in our region an Integrated Resource Plan for water supply. This is not just a plan for my agency, but it is a plan for the region as a whole, it includes all of our customers and all of the retail 250 some odd retail customers for the area with a diverse set of supplies. That is kind of highlighted or underlined some of the key demand management type programs. We have water recycling, groundwater recovery, conservation, and the new one that we are exploring seawater desalination.

To give you an idea of how our supply strategy has changed in recent years, I would like to point out these differences before we did the IRP and after. If you look at this chart, you will notice a heavy reliance on state project water. You can see a very large part of the pie. You can see how that has shrunk now. We shifted our priorities, conservation was a healthy amount. It is larger now. Recycling and development of local resources is much bigger. So, our entire supply strategy has shifted with a great deal of emphasis on these alternate supplies, so we are not entirely reliant upon our imported supplies. With that, all of these local actions are generally much more energy efficient.

I would like to give you a little bit of a snap shot energy use. We are a net user of energy. Under the state water project, Metropolitan by virtue of its distance from the supplies in Northern California and the amount of water we move, we consume about oh two-thirds of the power that the state water project uses.

In a year like last year, to deliver water to our service area, involved about 5,600 GWh. Now the project also generates power, and in that year, our share of the generation was about 2,400. There was a net draw on energy resources associated with our moving water for the state water project, about 3,200 GWh.

Our Colorado River Aqueduct is more energy efficient, and if it were full, it is not right now, but if it were full, we would require about 2,400 GWh. We have large treatment facilities in our service area hooked up to the grid, and those in turn require about 30 GWh.

Lastly, I will point out that we have small hydro that we generate as water comes back into our service area and travels downhill. Last year, we generated about 480 GWh.

When you add it all up, last year for our agency, our draw on energy resources for the state was about 4,700 GWh. I will point out that picture, that is our Wadsworth Pumping Plant that pumps water into our Diamond Valley Reservoir.

A short time ago, we had it relicensed, so now it is a pump gen facility. So, as we take water in and out, we can both generate and at times have to draw energy, but it is a step we have taken forward to be more efficient and more optimum in our energy practices.

We do have staff dedicated to energy resources. It is a big deal in our agency in simple terms. We have about ten people involved with energy strategies and acquisitions. We also have about 20 people that do the field work on the plants and transmission systems.

Our Colorado River Aqueduct, our major source of energy, is through contract with the federal government. We receive power from Hoover Dam and Parker Dam. We do fill in when we need to with off peak energy purchases.

When we have more energy than we need,

we have an exchange arrangement with Edison. We also have a load shedding agreement with them. We can do 20 load sheds a year up to four hours.

I also we spent $30 million upgrading our pumps. We can now pump the aqueduct full with eight pumps what used to require nine, and that is a savings about 100 GWh per year through that investment.

It gives you an idea, again, of where that power is coming from. With the aqueduct right now, it is running less than full, we are not doing any of these spot purchases, we are just in this arc here of our energy resources.

This will give you an idea, we have 230 KV line that we use to deliver water from the Hoover/Parker Dam into our aqueduct pumping plants, and that is connected to the grid.

On the state water project, you may be familiar with the generation facilities up at Oroville. That is undergoing FERC relicensing right now, and that is also a big concern to us that we can sustain the generation that we are counting on at Oroville. I think it is about -- well, I won't guess, but it is substantial.

It also has a pump generation

facilities. As water travels down the state water project, there are recovery units that the state operates in addition to the ones we operate.

There is an off peak pumping strategy on the project. There are some four bays strategically operated to use the storage and avoid the on peak pumping.

We at Metropolitan are constantly in contact with the Department of Water Resources to strategize the timing of water movement to minimize energy. Our water bill this coming year was in the range of $300 million. So, we have a great deal of interest in how water's moved and how energy is used for that.

Of course, on the state project, they have load shedding and they can drop pumps as well to help the state as needed.

There is a project I want to call your attention to that the state just started construction on. This is strictly an energy management project. It is called the Tehachapi East Afterbay Project.

Located up here just after the 1,900 foot lift on the Tehachapi, water comes out (indiscernible) in these east and west branches.

It is a relatively small reservoir, but it will have a significant benefit in terms of allowing the supply to be sustained while dropping the Edmundston facilities during peak demand hours.

I also actually have benefits what we call the valley stream, which is a whole series of pumping plants bringing water up into that location.

This will give you an idea of our distribution system, and you can see the five treatment plants out there, which again are energy consumers.

Our retail load is served by local utilities, Southern Cal Edison, LA Water and Power, City of Riverside. We do have interruptible service at some of the plants. We also have full diesel generator back ups as needed.

We are dealing with a change water quality conditions, and I think this was something that you were interested in. New standards for disinfection byproducts is requiring us to go to a different mode of treatment. The different mode of disinfection, and that is ozone.

Ozone has the potential for doubling our requirements for energy at these plants, so it is about 30 GWh now, and that may go up as high as 60 as we get the ozone facilities in.

I would also like to point that we just issued requests for proposals on solar energy that we can site at these facilities. We are taking a hard look at alternative supplies in our system.

This will give you an idea of the 16 generation plants we have as the water cascades back down, where we have pressure systems. We are trying to generate all the power we can out of it.

In terms of efficiency, we have a number of programs that we work through our member agencies recognizing they are the people that work with the retail customer. We provide incentives to our members to develop conservation programs, water recycling, brackish ground water, and seawater desalination.

When you look at our expenditures over about the last ten years and what we have projected in the future, I hope this gives you an impression we are very serious about this. We've got commitments either made or will be made in the range of almost $ 2 billion.

What we are doing is helping bring

actions into being cost effective against buying our water, helping motivate the customer to do something different out there that is more efficient.

In terms of water recycling, groundwater projects, all of these dots -- each of these dots represents a multi-million dollar project. These are big projects that we believe that probably wouldn't be in without incentives. Again, they are developed by our local agencies, we enter into agreements to bring them down so they are cost effective against our water rates.

We have agreements that go out for 25 years in terms of paying. All of our agreements are paid for performance. They have to provide the value to get the money.

Recycled water. Recently the state task force pointed out the needs to have a more friendly regulatory environment so we can move these projects faster. There is some legislation. I was just at a meeting this morning on AB 371 to help us move in that direction.

This does replace directly one from one demand on imported supply system. We have about half of the state production in our service area.

We are very proud of what we are doing, and we have all sorts of projects that are expanding and growing.

I will point out one of the uses is we are providing cooling water for power plants. By providing recycled water, of course, this frees up more local water for potable use and avoids the energy lifts on the imported systems.

Of course, these local supplies sitting down here on the energy scale compared to here is our east branch of the California Aqueduct about 3,200 KWh for an acre foot. Of course, this will give you an idea that seawater has come down to become close but not quite competitive yet, but the technology is changing, and I have a hunch it is going to be in there pretty close pretty competitive very soon.

Conservation, we have a very strong conservation program. It is targeting three different areas: residential, indoor, commercial. We heard the term CII, that is in fact the term we used as well, and outdoor landscape. If you were to look at where we are in our targets for the region, we are probably about half way there.

I'll point out this 655,000 acre feet of water that we saved collectively as a region. If you were to use the formula of a football field one foot deep is an acre foot. That savings represents 124 miles stacked of acre feed on top of a football field.

We recently received some awards related to our water conservation programs that came to us from energy interests, CMUA and Flex Your Power, and we are very proud of that and hope we can work more with these parties.

A Residential Indoor Program is principally one of retrofits. Of course, we have done a huge amount of toilet replacements in our area, that's cold water. One of the areas that we are focusing in right now are high efficiency clothes washers and those do save water an energy. I will talk about those in a moment more as I go on.

Save a Buck, that's our program specially tailored for business, so it is to get in there and do some of those units Gary was talking about. I think one I didn't see on your list was the commercial dish clothes washers that are in hotels and all over the place, big energy consumers and big water consumers. We are saving energy again here.

Here is the Pre-Rinse Program. We are fortunate enough, is Mary Ann still here? Mary Ann has helped us to get a grant for our service area. These units are dynamite. They used to rinse the dishes off before they go into the dishwasher in a commercial kitchen. Basically through the help of the grant we received from the PUC, we have people walking out on the street installing these for free in restaurants.

One of these devices alone saves 50,000 gallons a year of water, and that is hot water that we are saving water and energy.

This is a type of a program we hope to see more of in the future when we combine our interests and our resources.

We have an Industrial Process Program, another that perhaps Gary to think about is just simply the cross manufacturing process water. Each industry has its own tailored unique process, but if you can get more passes on the water in a metal finishing or a die house or an industrial laundry, you are saving water and perhaps energy as well.

Landscape is probably our biggest

frontier for the future, our biggest opportunity. We are exploring a whole number of different areas. Right now we have a $2.5 million advertising campaign that we are doing in the southland to try to get people to focus on this.

Of course, native plants, if we can get everybody with native and drought tolerant plants, we would have a tremendous benefit for the region.

The Flex Your Power folks have been working with and the BIA, the Building Industry Association, has been working with us on our efforts to install model homes, to use those as models of efficiency. This is really an advertising campaign. When the home buyer comes in, they can look at this and see some choices.

When the person who is not a home buyer, the looky loo comes in, they can take these ideas home and think about retrofitting their own homes. So, this is something that we are just getting going with the help of the Bureau of Reclamation and we are pretty excited about this.

I would like to point out, I am getting close to the end. Our agency does have a water efficiency rate structure, even though we are at a wholesale level. We do charge for all of our water is commodity based. It is expensive to buy our water.

We have two tiers, so as our customers look at buying more water from us as their demands grow, they have to move into tier 2. It is about $80 or $100 more. I'm trying to find my numbers here. Oh, here they are. Tier 1 is for treated water is $440, Tier 2 is $224.

This is an appreciatable difference. We are finding that the agencies that are buying our water are trying to figure out how to avoid Tier 2. They are trying to become more efficient in ingenious ways, so we think our rate structure is working.

We have a peaking charge as well, so of course, that has to do with a whole system requirements and energy and everything else. So, if we can get them off peak or manage our peaks better, that will help the region as a whole with providing storage discounts, so they can store in the winter and use it in the summer. That is a benefit.

We do have a stewardship charge to help finance all of our incentive programs. So, the agencies get to judge how much they want to spend on our conservation, recycling, seawater, and the support has been very strong in the region to in fact, incur the cost to make sure we are more efficient.

Partnering Opportunities. In our case, all of the things that we are doing, all the money that we are providing for efficiency programs, have a sound business case behind them. They make good business sense for us to do that and avoiding future expansions on our system in terms of avoiding O & M costs.

We would like to bring that effort to the table with other parties. We would like to sit down with you and find out what your business case is and see if we can merge our interests, offer a common incentive for the high efficiency clothes washer or for the improved landscape, or whatever the item might be so we all benefit, and it all makes good business sense.

We shouldn't be fearful of this. We think there is actually plenty of opportunities to work together across this different disciplines. We are trying hard to look for innovation. Again, we are looking for partners on that. We have a grant program we call "Innovative Conservation" to come up with new ideas. They are new ones that come up all the time.

I will give you an example. We had an inventive fellow down in our area who came up with a device that recirculates water on a hospital x-ray machine. You might not know this, but a hospital x-ray machine has water run through it all the time. It has to have water flushing through it 24 hours a day, 365 days a year.

This guy put a little device on it that allows the water to recirculate. He reduced the water demand by 98 percent. The hospital wants to install one of them, we will give them $2,000. We wouldn't have known about that without the outreach on the innovated program.

We think there is room for regional benefits, statewide benefits, and of course one of the areas that is really high on our agenda is an option item that is on your agenda that is your responsibility is to try to receive this Department of Energy exemption for high efficiency clothes washers.

We know Mary Ann Dickinson has been working with Michael Mott of your office. We understand you are ready to submit on that. We would be very anxious to help you if you want to call a little more attention to this. Join our lobbyist forces because this is a real important one in terms of savings that -- I will point out, we are probably spending $300,000 or $400,000 a year to encourage people to get these high efficiency clothes washers in. If they become the law, basically we can reaim those resources at other efficiency measures. We would be very anxious to work with you on that.

COMMISSIONER BOYD: We are anxious to have all those cards and letters coming in too, so I appreciate the invitation.

MR. SIENKIEWICH: We will be there, just give us a call, and we will be right there. That's it, I am going to close with that, and I will be glad to answer any questions. Thank you. I hope I wasn't too long.

COMMISSIONER BOYD: Very good, thank you very much. It is very interesting. I am impressed.

MR. KLEIN: Would you be interested in some ideas related to every 50 homes representing a new acre foot of water indoor savings?

MR. SIENKIEWICH: Having a standard?

MR. KLEIN: No, no. We actually have got some new technology for you to look at.

MR. SIENKIEWICH: Yes, absolutely. We are trying to work with the building industry. As you know, any kind of change is not easy, but they are receptive. What we have found is that they are finding that home buying public is receptive to that, so absolutely.

MR. KLEIN: Thank you.

MR. SIENKIEWICH: You're welcome.

MR. TRASK: Just one quick question, Andy. You mentioned seawater desalination costs coming down, and you said in the very near future. Can you give us a ballpark number of years where you think --

MR. SIENKIEWICH: No, I don't really have a crystal ball other than I am pointing out the curve has been coming down for some time, so I don't believe there is any reason to believe it is going to flatten out and just sit where it is. I think in this case, we are reliant upon the ingenuity of the folks that are selling those membranes to the desale membranes to keep advancing the technology, so we are hopeful, let's put it that way that they can bring it down.

MR. TRASK: Any other questions, comments?

COMMISSIONER BOYD: Thanks.

MR. TRASK: I see my agenda --

COMMISSIONER BOYD: I suggest you keep it with you from now on, Matt.

MR. TRASK: I think that is a good idea, yes. Our next speaker is Martha Davis, who is the Executive Manager of the Inland Empire Utilities Association, IEUA, a mover and a shaker I might say in the energy and water world.

COMMISSIONER BOYD: Martha has been a mover and a shaker in lots of worlds.

MS. DAVIS: Just a troublemaker, sir. I am very pleased to be here, and I am going to -- really what I am going to be doing is building on the themes that Andy Sienkiewich just laid out in terms of the importance of the diversified portfolio for water planning, the way in which energy had come into the way that we as water agencies are approaching, the way that we as water agencies are now beginning to really pay attention to the energy component of our water supply planning.

My agency, the Inland Empire Utilities

Agency is a member agency of the Metropolitan Water District. We are located within the interior of the warmer area of the coastal plain and Southern California. We are part of the Santa Ana water shed, and we overlay the Chino Basin, which is one of the largest groundwater basins in Southern California, so as you will see, groundwater supplies are a critical component of the reliability for our community.

My agency is actually an integrated agency because we provide both at wholesale level distributing imported water supplies to the 700,000 people within our community. We were formed 50 years ago and went on the Board of the Metropolitan Water District.

We also provide the regional sewage treatment services for our community. In addition to that, we are helping to run through a joint power authority a desalination plant. We are doing bio-solids management, and we are building right now the state's largest completely enclosed composting facility. We are also doing the recycled water program and a conservation program.

Our area is one of the areas of the State of California that is faced with a tremendous amount of population growth, so we are expecting by the year 2020 to grow from about 700,000 people to a million people.

As we are addressing the issue of how to meet our current needs, we are also faced with the challenges of meeting all those growths. So, we are an area where you are in the conversion of agricultural lands to urban uses.

This just gives you a quick overview as we look at our population growth that increase in our water demand, the challenges of meeting the demand in this area, and you can see here Andy's point about the diversified portfolio of moving from a time when we were largely dependent on ground water and surface water, with a smaller amount relatively speaking of imported water supplies.

As our population grew, by the year 2000, we were really looking at imported water supplies becoming a very major component of our water supply future. As I will be talking about with the energy crisis and some other factors, as we have revised our planning for the future, what you see is this diversified portfolio emerging where we are looking at developing a significant amount of recycled water.

If you remember from the slide Andy showed on the State Task Force recommendations, and the Southern California portion of recycled water, we are looking at somewhere around 250,000 to 300,000 acre feet of recycled water supplies. About 90,000 is going to come from our region alone.

As you can see, we are planning a future that is based upon a very diversified portfolio of water resources including hard conservation investments in things like the ultra low flow toilets, high efficiency clothes washers, landscape outdoor irrigation that will yield hard conservation savings, reduced demand within our region.

Energy is a significant component of the cost of our water supply. I will show you a slide with the energy intensity, but it basically ranges from the 400 to 3,200 KWh per acre foot.

The energy crisis in the year 2000/2001 profoundly shifted the way in which we were thinking about water supply planning. One of the first things that we did is we put together really a seven point plan for dealing with the energy crisis.

The core of it was a policy of energy self sufficiency. How could we figure out ways to be more efficient and actually reduce our need for energy coming into the region. We were one of the recipients of the Flex Your Power award. We really reevaluated our water supply options in light of our energy requirements.

This is the Bob Wilkinson that he did based on looking at our area of looking at energy intensity, and of course, you will see recycling 400 KWh per acre foot. Groundwater pumping In exchange. Even our desalter, which is a brackish water desalter is going to consume significantly less energy than imported water supplies in a close ocean desalination is the most intense.

As we look at the water assets of the Chino Basin, and this is where you really start looking at how water supplies in a region are linked and the processes that link them. This is going to be important for Bob and Gary and their assessment because you have a tendency to look at things as separate, but when you are dealing with the linkages between water and waste water treatment and groundwater supplies, what you see is you are trying to maximize the synergies amongst all the different systems.

We have a huge groundwater basin with a million acre feet of brand new storage capacity, where we have the opportunity to find ways to make better use of that groundwater supply. As part of that recharge capacity, we can develop our recycled water, both to the place one for one current water uses such as outdoor irrigation, but we can also use the recycled water as part of our groundwater recharge strategies.

Storm water capture. It is going to be a huge issue for the State of California. We have allowed our systems to largely loose their capacity for absorbing the rainfall that does fall on the soil, and I will show you a slide in just a minute of why that has become so important in our region.

We are estimating that we are losing right now approximately 50,000 acre feet of recharge that occurred with just normal rainfall within our basin. Because of the strategies that we have used for flood control and because of (indiscernible) that is coming to our area.

In terms of the opportunities for water

efficiency, the particular focus on landscape conservation cannot be overstated. In our area, about 60 percent of the water use is actually for outdoor irrigation, which creates a very important opportunity.

Very quickly on this slide, let me see if I can do this right. The bar chart is showing the amount of water that is flowing on an annual basis over the last 70 years at a pinch point in our basin called the Prado Dam. So, we can measure all the water that is going out of the basin.

This dotted line is on an annual basis cumulative precipitation, and the take home point here is for the first 50 years of the record, we have had some remarkable wet winters, but with their modest amounts of water flowing out of the area.

When you hit the last 20 years of the record, those lines invert. What you are seeing is fairly modest rainfall events causing very large amounts of water to flow out of the basin. What that represents is 50,000 acre feet on average that our groundwater basin is losing.

In order to recharge that, until

recently our strategy has been to use more imported water supplies.

This is the integrated water resources program for our area. It is a $350 million capital project program over the next ten years where we are looking at investing in desalters so that we can capture those areas of our groundwater basin that have been heavily contaminated with salts and nitrates from past agriculture and human usage in the area. We have developed the highest quality through those salters.

We have an integrated recharge master plan that is deliberately going after trying to recapture for the benefit of the basin. Storm water will also be using recycled water and imported water that is available during the wet years.

We have a project with Metropolitan Water District, a conjunctive use program for dry years where we are developing about 100,000 acre feet of new water supplies for dry year periods, and then of course I have talked about the recycled water and the conservation.

This is the take home point. Historically, we would have anticipated looking to the future with the amount of growth in our area and the water needs of our area of almost of doubling our imported water needs.

With the integrated strategy and the capital investments that we are making in our region, we anticipate being able to keep our imported water supplies on average over the next 20 years at about the level they are today.

The take home point in this chart is our ability to roll back our need for imported water supplies during dry year periods. From a water supply perspective clearly that is an important strategy for sharing limited water supplies between Northern California and Southern California and within our own Southern California family.

Also, that is the time period where we are facing significant peak energy uses, and that is one of the ways in which we can reduce our stress on the system.

Now I am going to turn to our energy requirements, just overall in our waste water treatment system and our groundwater pumping, we have a peak demand of about 9 MW. With all of the growth in our area, we are projecting this demand to grow to about 25 MW and that is within the next ten years.

We have been very focused on developing self generation capacity. We are currently a little over 7 MW of power. The majority of that is through co-generation. We also purchase natural gas for self generation, and one of the things I wanted to emphasize today was some of the opportunities in the innovative projects my agency has been working on in collaboration with the agricultural community developing digester gas through dairy manure digester. In fact, this is a project that has been sponsored by the California Energy Commission through the PIER program.

Currently our net energy requirements are at about 2 MW. I'll have a picture of it later, but I'm also very pleased that in building our new headquarters, which we completed two years ago, we are one of there buildings in the country to achieve the platinum standard to lead. We are anticipating being 100 percent energy self sufficient by the year 2006 and being able to use some co-generation that would complete our ability to be off the grid.

This is just to quickly the primary uses of energy. We are approximately 65 MGD right now of touchiary waste water treatment. 9 MGD of groundwater pumping which is basically the desalination. There is additional distribution energy demand for imported water and the recycled water distribution.

This gives you a quick snap shot of the projected energy loads by 2010 so you can see how we are going up to a peak of 25 MW. Most of the increase in demand is really it is the increased volume of waste water treatment for the rapidly growing community. Then our increased recycled water pumping.

This just gives you a break out of our treatment facilities and where we have been able to do the self generation.

In terms of our strategies, over all they have been in five areas. Number one is to do everything we can to energy efficient best management practices in all aspects of our facilities and our operations. Even with all the emphasis with the newly platinum headquarters, we are identifying all sorts of opportunities for improving pumping and lighting efficiency. We feel like we've only touched on the true potential of what we could do for our own facilities.

Certainly the second strategy is reducing our dependence on high energy intensity water supplies, implementing an array of the conservation programs in partnership with MWD and developing our local supplies.

We have worked hard at shifting all the peak loads that we can to partial and off peak periods trying to incorporate a lot more process flexibility into the way we operate our system.

Maximizing the digester gas production and its use has become an incredibly important part of our program, particularly when we have the opportunity to incorporate net metering as part of the way in which we can apply the benefits of the dairy digester and then developing our local energy resources, both through the processing of the organic material.

Also we have been looking for capturing the energy value of falling water in the pipelines in our out falls, which is something we had not looked at previously.

Very quickly, in our organics management program, we have probably have picked up the greatest headlines around the dairy component of the digester, but the reality is, this is important strategy that is normally including in waste water treatment facilities.

You are dealing with bio-solids, and the digester strategy is just an enclosed heated composting facility and pressurized. It is an important part of helping communities deal with the organic waste challenges facing the community. So, it isn't just the opportunity to partner with agriculture which is the focal point of our program, but the ability to partner with all aspects of our communities to deal with the organic materials.

What comes out of this is not only renewable energy, but high quality composting products that can take the place of petro chemically based fertilizers and also significant air quality improvements.

This is the digester that was constructed with grant funding from the California Energy Commission. One of our goals at this point is over the next ten years to produce ten plus of MW of renewable energy. Again, we want to treat and reuse locally 100 percent of our own bio-solids generation. So, it is part of a philosophy of being 100 percent responsibility for our products.

This just gives you an idea within the southern portion of our system, between our new headquarters, our newest waste water treatment plant, the digester that we have constructed, and the desalter how we have tried to integrate the whole system and have redundant lines of running methane gas lines as well as the power lines in order to be able to take advantage of the digester output.

Again, we have just our lead headquarters and we are very proud of it in terms of the significant reduction in energy usage and the amount of savings that we have been able to document in terms of the operation savings on energy costs alone is about $800,000 a year.

Just to wrap up, in terms of some of the barriers we have seen to developing a strategy of self sufficiency. Some of the smaller points, but they are important, number one, we are metered at multiple points, and it makes it very difficult to really figure out a strategy for energy self sufficiency.

If there was an ability to aggregate all of our electric loads into a single consolidated load, we would have a lot more flexibility in trying to figure out how to take these very complex systems and procedures that we are operating and bring them together and maximize energy efficiency.

Number two, the CPUC single premise rules discourage building generation greater than the connected load. We are really interested in particular right now and the opportunities that the digester and that meter program provides as potentially trying to link systems and to be able to take the benefits of the self generation program and run it through the entire waste water treatment facilities.

Number three, I hate to say it, but as aggressive as we feel we have been in trying to take advantage of programs either from the water side or the energy side for incentives, as we have begun to really take a look through the CALEEP project that the opportunities for incentive based programs that would help us do a better job, we are realizing that we are really just scratching the surface of the true potentially. Finding ways to get this information out to agencies out to ours that would be very happy to partner with the State of California and finding ways to be more energy efficient and more energy smart is I guess the way to put it. There is clearly a lot of work to be done on doing a better job of getting this information out so it is really being used.

Finally, waste water treatment systems and agencies like ours, really have unique opportunities for developing renewable energy, and whether it is to borrow gas, whether there is opportunities for low head hydro through the pipelines, there are some very innovative programs that we could help to develop, and we would like to do that with you.

I think incentive programs are the key to testing these new technologies. They need to be tested at scale so that we can really make sure that they work and that there is a good business case for them.

I can't say enough about the importance of the net metering bill SB 728, that is essential really capturing the full value of these renewable self generation programs.

With that, this is our view of the Chino Basin. We see the systems as being linked as you move from cost effective energy to operate the facilities to the way it links with groundwater, recycled water, bio-solids. If we start closing the loop, we will be able to have much more efficient processes which will be cost effective for our customers. Thank you very much. I'd be happy to take questions.

COMMISSIONER BOYD: Thank you, Martha. Just a comment and a commercial maybe. I have been aware of the work you've done with digester and what have you for a couple of years. I have just recently become aware of one of the research projects that you are hosting there, the Catalytic Combustion Turbine use of very low BTU gas which fascinates me quite a bit.

I've dealt with some of your engineers in the past about digester applications. I want to follow up with you in the future in developing some of the relationships that you indicated were needed, and I want to mention to you that the administration has authorized me to start -- to me it is a restart, but to start a bio-energy working group within the state government to identify a lot of the issues, barriers that we need to knock down. We eventually want to partner with folks like yourselves and others on what can be done.

I agree with you, there is just all kinds of potential that is not being realized, so you will be hearing from me.

MS. DAVIS: Excellent, I look forward to it.

MR. TRASK: Speaking of aggregation, our next speaker is Lon House. He is the energy advisor to the Association of California Water Agencies, and he will be talking about load aggregation programs that ACWA is working with their members on.

MR. HOUSE: Good afternoon, this is Lon, and according to the schedule, I am already done, so I will see if I can make it pretty fast. Let's see.

This is just a summary of where we are in the water agencies. Water agencies currently drop about 400 MW during the on peak period in response to time of use tariffs. You have seen in that previous slides.

We have several hundred additional MW enrolled in utility interruptible tariffs, and I'm a little bit vague on that one because I am actually getting those numbers, but I was not able to get the numbers from the utilities in time for this.

We have additional capacity that I am going to talk about, this participate and demand response programs over the years, and we have additional hundreds of MW of additional capacity that could be available if it is worth our while.

The issue is that the water agencies can drop a significant additional demand, but it costs us a lot of money and it costs us a lot of hassles, and I just put several things up here.

One is if you are going to use water out of storage and not pump it, you are going to need additional sensors throughout your system to make sure you are maintaining pressure and residual water quality characteristics.

You are going to need more controller and valves to avoid inadvertent flows, particularly during the refill period in the evening. You are going to need additional staffing during the refill periods to make sure that there is somebody, that you've got a full operational staff operating in case something happens during that refill period in the evening because that is where you are running your system at about the hardest.

I just put this down here, additional storage costs about $1.60 per gallon. That says if you put in a 5 million gallon storage facility, it is going to cost you about $8 million.

The point is that if we curtail pumping demand, that is more operational risk for our system.

I put this up here because this is actually the graph down below turned out to be exactly what I thought it would be which I thought was kind of interesting. These are the demand response programs that were originally run by the ISO, and then bounced around.

What I did is from the year 2000 to the year 2005, I put down the number of MWs that were involved in the demand response programs and graphed it along with the price that was offered in the demand response programs.

That looks like a pretty good relationship to me. What that says is obvious is that if you want it, you are going to have to pay enough for it to entice the water agencies to mess around with their system in order to get them to curtail their peaking demand.

What I did here is I just went through, and so after I produced that slide, I said well, what would it take in order to justify, in order to get water agencies to participate, what would the financial incentives be in that.

What it is, is that I went through and I calculated this. If you based demand response programs and actually this demand response program is ACWA has a group arrangement with Ancillary Services Coalition, and they are the ones that do our demand response. The water agencies contract with Ancillary Services Coalition and they are the scheduling coordinator that does the demand response.

If you take $85 a KW year which is the PUC determined avoided capacity costs, which you guys know is an annualized combustion turbine cost, spread it over four months, that gives you $21,000 a month.

If you look at the previous graph, that is enough to get 30 to 35 MW back in the old days before people really started thinking about that.

Then you need a per event, which we talked about. The point of this draft is let me see if I can go back. Right now if you are paying instead of $20,000 MW month, you are paying $7,500, so you see you've got very little response from the water agencies because it is not worth their while to do that. I will go into that in just a second.

What I did is I said all right, I talked to a number of our guys, and I talked to Ancillary Services Coalition and said if you had to create a perfect demand response program, what would you do, and these are the characteristics.

It would need to be a multi-year program because many of the changes that are made within the water agency operation are not just staffing changes, but they are hardware changes, and you need to be able to recoup that investment over one year. It is very difficult to make major configuration changes in your system and recoup it over a year.

So, you need a multi-year program so you can basically amortize your capital costs over several years. You need to demand payment to pay for participation in the program, and that is just a fixed payment per month and that pays for your capital investment.

Then I talk about here the payment of a

fixed return. I said the water agencies aren't going to the -- the water agency customers are not going to be impressed if their district saved the state from blackout, but they ran out of water, they don't have enough pressure, fire protection required to boil water. That is what the water agencies are saying. If we jeopardize our system, we are not going to do it.

A per event payment, which will cover the additional staffing requirements and component wear and tear. A reasonable verification criteria, and let me go back and I want to show you something from somebody that you talked about before.

The first two years of this demand response program, we had 33 and 25 MW in this program. The next year, the price dropped, but also one of the big things that happened was you had Will talk to you this morning from Semitropic. He has got 5.5 MW of generation sitting on his property, he didn't use it last summer, and he has no plans to use it this summer because it is too expensive for him to turn them on number one.

Number two, what happened in 2002 was Semitropic was running along about 20 MW, and they received a call and they dropped 6 MW, but when it came time for reconciliation, the utility and the ISO would only pay them for about 1.5 MW because what they had done was they were using the ten day rolling average. When you deal with irrigation districts and you soften the graph there, the electricity use on any given day is dependent upon water deliveries. That particular day that they had the call for an interruption or the demand response, they were using their system pretty much flat out.

When you average it over the previous ten days and the previous week had been pretty cool, they didn't have enough load to take it off of.

They were saying we were running along, we dropped 5.5 MW, you are going to pay us for 1.5 MW, you guys can get lost, and we are never going to do this again.

One of the points I wanted to make here was that what you need in addition to a ten day rolling average for determining what your load drop is that you are going to get paid for, you need to be adjusted to load drop from the previous hour.

So, if they are running, particularly in agricultural districts, is running very hard the day that they are curtailed, they want to get credit for what they are actually dropping.

Accurate and timely settlements and adequate curtail notification. One of the things I wanted to point out down here is if there is some sort of a standard that is set up like the critical peak pricing program in which the water agency knows that it is indexed to temperature or some other thing, they can start preparing ahead of time instead of just waiting.

Remember, when they shut off, they have to keep staff on in the evening to refill everything. If they have some indication that something is going to next week is going to be a hot week, they can start dealing with their staff and saying hey guys or women, you are going to have to stay later most of the week because we may have a problem.

The agencies' ability to reduce peak electricity demand falls in several of these areas. One is the more aggressive use of their existing system, primarily pump scheduling and storage use.

The first point is this requires some kind of an analysis or system simulation to make sure to assure the operators that their system won't be compromised doing it and operating it in a new way.

Secondly, it requires additional staffing and additional sensors and controls. I'll talk about some of these sub points in just a second. They can add or accelerate additional storage. In many of these cases, the water agencies have additional storage that they are planning on adding in the future. They can add it or they can oversize it.

Peaking generation. One of the things we talked about is solar, and actually as of today, ACWA has a solar preferred partner program in which we have contracted with two photovoltaic suppliers for photovoltaic installations within the water agencies. So, I suspect there will be -- water agencies are very interested in this because of the peak load requirement.

In the hydro-electric generation, you saw in Met's case, they have little hydro facilities spread throughout their whole system. If you think about it for a second, if you are pumping water up a hill to a storage facility and what you can do is you can convert that pump to a reversible pump turbine, and when the water is rolling back down the hill, you can use it to produce electricity.

The problem is, and I've talked to you guys about this before is there is no place to send that electricity at that point because that is not where your pump is. That is the pump that you use to pump and fill up the storage facility. You are not using it when the water is rolling back down hill, but there aren't any pumps close by it. So, you think every storage facility, every tank you see sitting up on a hill in the urban areas, has the potential for a hydro electric facility associated with it that will operate during the on peak. They are not put in because there is no place for that electricity to go.

The last is to get the water customers to shift water out of the on peak period. One of the things that we have talked about here before is the proposal that is before the Energy Commission for time of use water meters and time of use water tariff developments in a case study.

New storage and more aggressive use of existing storage. It is obvious. Water in storage is stored electricity. Took electricity, pump it up there, and it will not only not use electricity coming back down the hill, it can generate electricity coming back down the hill if there is a place to sell that electricity.

All urban agencies, and all is a pretty inclusive word, but all urban agencies have some storage. The reason is that your demand varies throughout the day. You want to run your treatment facilities on a fairly constant level, and so what you do is you have to have some place fairly constant level, and so what you do is you have to have some place to put the water that you have treated.

You look every town around here has some sort of storage facility, but the water agency has to make sure that it can meet all of its water requirements, pressure, deliveries, and water quality in order to participate in some sort of peak reduction. Otherwise, they are not going to do it. They are not going to compromise their system.

You have seen this graph before, but

this was an interesting study that we did for El Dorado. Basically what we did here was we took these two tanks that they had and their cut off, their lower operating levels 28 feet in these tanks, it was 28 feet and it was like 30 feet in the other tank. So, we convinced them to let us try taking it down an extra three feet, so drop it from 28 feet down to 25 feet. That meant in a 40 foot tank, they still had 25 feet of water. That allowed them to drop 2 MW of load.

I think you have probably seen these graphs. The top graph is our system simulation which shows what the treated water pumping facility would look like in peak shaving operation. The bottom graph is what they actually used. The next one is very similar which is the wall water pumping facility.

The point being that virtually all water agencies have the ability to curtail some additional peak load. Their systems were not designed for it, their systems were designed from a water perspective, but they can do it, but they are not going to do it if they don't know that they can do it safely without jeopardizing their system.

So, this is what I think since you want recommendations, this is what I think that you need. For this summer, the first point -- actually I was just talking to Cohen, this may be solved, but the first point that I wanted to bring up as of yesterday was to free up the technical assessment money.

We currently do technical assessment for the water agencies that are system simulations that show them how they can curtail their peak load and things like that.

We have had a problem with getting payment from the utilities, and we still have a problem getting the protocol for actually getting, so we have five case studies that in Southern California that are stopped right now because we don't have a protocol set up for the utilities to reimburse us for doing the studies for the water agencies.

The water agencies don't want to pay for it because the utilities are going to pay for it. It causes quite a deal of frustration for us because we need to complete those studies within the next month because the water agencies basically need a month of messing around with their system to see if what we are saying will work because they want to say after we do a study, they want to say, okay, I want to try this. I don't know if these guys are lying to me or not, but I am going to try this. I am going to see if I can take six hours and run six hours off of storage.

It has been very frustrating for us for the summer because of some -- I don't know if you want to call it disagreements or discussions between the utilities and the Public Utilities Commission staff, the protocol for paying for these technical studies isn't in place, and we can't finish these technical studies which means the water districts don't have time to play with their system prior to the summer but basically we need to do it this next month or so.

The second point is allow financial incentives to be used for adding water agency storage, sensors, and controls. It is kind of a obvious thing, but it was a discussion that I had earlier this week, and what happened was we were talking -- I was talking with a utility person about some rebates for installing pressure sensors and water quality sensors and controls in a water system.

This was in conjunction with doing some additional storage. The question I was asked was, was how much energy does this nitrogen sensor save. I said it doesn't save any, and they say, well, we are not going to pay for it.

I go wait a minute, back the truck up. If you had somebody that was coming into a commercial building and said we need to replace your air conditioner and it will save all of this energy, you would allow the air conditioner to be replaced.

You would pay for the thermostat to be replaced and the controls to be replaced, right, because they are part -- the thermostat doesn't save you any energy, the controls don't save you any energy, but that is what is necessary for that new air conditioner to work. That is exactly the same situation we have with the water agencies.

If they are required to use water out of storage, they have to make it to avoid peak for six hours, they have got to make sure that water that is coming out in the last hour has enough residual disinfection and has enough pressure and one of the problems is nitrification, that they don't run into water quality programs. Otherwise, they are not going to do it.

This is a discussion that we are having with the utilities, but it is just something for your information, too, is that you may run into instances where there are technologies that the water agencies are asking to be funded under some sort of energy rebate program that on the surface looks like they have nothing to do at all with energy, but they are part of a package that allows them to use something else, particular to use water they kept in storage.

Okay, in longer term. Rate design and program stability. I know we keep harping about this, it is not really you guys' bailey wick, and I should be talking to somebody else which I do constantly, but look at what happened with the Demand Response Program. It went from $31,000 KW month to $6,000 a KW month in three years.

All the water agencies know this. They know that they can't sign up for a program right now without having the rug yanked out from under them in a year or two and having all of this investment that they put in being withheld. They just will not recover it.

Okay, Demand Response Programs which I have talked about, which if I had to design one what it would look like to entice water agencies to participate and how you would price it, but also to allow incentives for adding not just storage because we've had this discussion with storage too. The utility response has typically been, well, we are not going to pay for storage for you adding additional storage to your system because you are obviously adding it for another purpose which is water deliveries, and energy is just a peripheral aspect to it so we are not going to pay for it, and like what I just talked about earlier, we are not going to pay for any of these new sensors or any of these new controls because the sensors and the controls have nothing to do with energy savings. They only have to do with the way you run your system and essentially your product.

The ability to use addition generation. We as of yesterday, we have probably three MW of solar facilities that water agencies that I am going to be looking at for photovoltaic installations.

You guys already know the issue of the

rebates is a big issue, and you had Will come and talk with you this morning. He has got one MW, he has already put in the (indiscernible) to get another MW for this next year because he is aware that the financing is -- there is such competition for it that there are real questions as to whether he was going to get it.

The point is that the water agencies are really interested in solar, and they are a really good fit for solar. One of the things that we have is we have lots and lots of space around our facilities, and so it's a great technology, but there is the question of without the rebates obviously, they don't pay for themselves. So, that is an issue that is a concern.

Peaking hydro. Like I say, every time you drive by and you see one of those big tan storage tanks up on the top of the hill, think, there is a potential hydro-electric generator sitting underneath that storage tank some place that is not being used because they didn't put it in because there is no place to sell that electricity.

The last of the development and case studies for customer time of use water rates.

You know, I am very interested in if we can convince the water customers to shift their demand out of the on peak via the time of use rates, just like we are trying to do with electricity, we can save a lot of peaking demand.

The final point is, there are hundreds of additional peak MWs. If we get 10 percent of the on peak demand of the water agencies to be able to shift, we have got 250 MW that will shift out of the on peak, but we are not going to do it if it costs the water agencies money and messes up their systems. Thanks.

COMMISSIONER BOYD: Thank you, Lon. Questions, comments?

MR. WOLFF: Gary Wolff, Pacific Institute. Lon, I am interested in this idea of generating peak power through the water flowing back out of the reservoirs, but in some cases there is not enough head in the system to do that.

You know, you are going to extract energy from the system that was designed to provide a certain pressure in the distribution system by gravity alone from that tank.

That is all there is, there is not excess pressure available. What I don't know, and

I don't know if you know either is what percentage of those reservoirs out there that we have excess pressure that could be captured in this way, or what is it going to take to figure out how many of those reservoirs we have that kind of excess pressure in?

MR. HOUSE: What I would do, and actually I told Matt is I would schedule a presentation by Calleguas Municipal Utility District. They have I think 3 MW of small hydro on precisely this issue, which is coming out of their storage facilities.

I have yet to run into an urban area that has any elevation that doesn't have or rural areas or ag areas too, but some of the ag's are pretty flat. Like if you look at Will's place, you know, you stand on top of a gopher hill, and you can see from one end to the other, so you are not going to get much there unless you go under ground.

Virtually all water agencies that have any elevation at all, have the potential for small hydro. If you think about it, they all have their storage tanks some place up on a hill or something. What you've got once you pump the water up to the hill, you've got the effective head of that hill. If it is 100 feet, you've got 100 feet of head.

What you will see, and I've talked about this before, what you will see in a lot of places, you will see pressure release valves, and that is just to keep -- because you've got all this water sitting up on top of this hill. When it comes walking down, it is going to start blowing stuff out, so you have pressure release valves.

Any place there is a pressure release valve, is the potential for a small hydro facility. The problem is, and I've been a little bit cavalier about it, the problem is not just that there is no place to sell it, the problem is these things operate -- they have a very low capacity factor.

The interesting thing is, they are all peak capacity factors, right, because you pump it up at night, and you let the water run out of these things in the daytime. Even though you've got a very low capacity factor, you are using it during the times of highest electricity use.

We have never been able to capture this, well, with a few exceptions, and Calleguas put in all of their facilities in the QF hay days of the 80's in which they could get the standard contracts.

I guess the point being is there is a lot of potential out there, but I think it is economically constrained in an unfortunate manner. There is no place to sell the electricity number one, so there is no place for it to go.

Actually one of the interesting things if you get Calleguas up here to talk about it, what they are doing and it is what I am recommending all the water agencies do, is when they go in and start trenching, they lay electrical conduit in all their water trenches.

What they will eventually be able to do, is they will eventually have a system that is very similar to Will's which is they will have electric conduit running along their in their water right of way so they can generate electricity here, but ship it over to where they need it in their system where their pumps are and never touch the utility lines.

The problem is as soon as the touch the utility lines, that is the kiss of death on these things.

MR. TRASK: Any others?

MR. BROOME: The case in point, this is Ken Broome, the City of Palo Alto has a stair step of storage tanks up the hill there to about 2,000 feet elevation up the Santa Cruz Mountains.

The reason they said they would like to put in a pump storage system is that the resident's time of water in their tanks is less than the usage time. In other words, they have to drain the tank for water quality reasons, so they were really interested in putting in the kind of system you are talking about.

I think the Energy Commission actually has a program of PIER Program projects for that purpose, so I would certainly like to do a project like that.

MR. HOUSE: That is a good point. When water comes in to these various systems, it is run through a treatment facility. In the treatment facility the water that comes out of the treatment facility meets whatever quality standards you have.

Then they go stick it in a tank some place or they use it. The problem is they can't leave it sitting in that tank for a very long period of time, and they all have requirements.

Without making sure that when the water ends up coming out of the tank, it has the residual disinfection levels, and it has a nitrified. That is one of the issues that this gentleman just talked about, it is water quality becomes a real problem when you are dealing with water that is left in storage for a long period of time. That is why participation in these programs requires in most cases additional sensors to be installed throughout the system so they make sure that they know what the water quality condition is.

Now one of the things they can do in a case like this is and what some of the agencies are doing is they are blending the water. They have got some water that is coming out of the storage facility, and it may have degraded it. It may have no residual disinfection left in it, but they can blend it with the treatment facility water and still maintain the residual level.

Their systems weren't set up to do that in most cases because they were set up just to deliver water, so there are additional costs and additional requirements necessary to do that.

Like you said, there is a tremendous potential out there, and it just not being used.

MR. KLEIN: I have one last question four you. You talked about the programs with the electric utilities and the water utilities need to be stabilized over time, you just can't have a one year on one year off event, how many years are you thinking about is needed for stability.

MR. HOUSE: A lot depends upon -- well, when I talked to -- you are talking to a water guy, right, or a water energy guy. We build dams that last 50 years, so you are asking the wrong guy, right. The response that I generally got was five years.

Five years is a long bureaucratic planning horizon I understand. It depends upon if it is less than a couple of years, they are generally going to pay the staff over time because you don't want to hire people for one year for a program and say, oh well, the Energy Commission or the Public Utilities Commission changed their minds and so you are all fired because we are not going to do this next year.

There needs to be some planning horizon for staffing levels. If it is a short period of time, they will just over time. If it is a much longer period of time, then they can do the economics and justify adding staff.

Then it depends upon what your repayment time is for your capital improvements. Most of the sensors and controls are not very expensive. If you are adding an $8 million storage facility and you are going to accelerate it solely for peak energy benefits, you want to make sure that you get on a program that will give you peak energy benefits for more than one year and generally five years in order to pay that off over that period of time.

I guess the rule is that the people that I've talked to would like five years. I realize that is a long period of time, but if you viewed demand response the same way you did generation, they enter into generation, they enter into contracts for generators for five years. You could enter into a contract for a demand response program for five years too.

MR. KLEIN: Thank you.

MR. TRASK: If we could only figure out some way to recover the energy that Lon puts into our PA system.

COMMISSIONER BOYD: He has a lot of good ideas, it does take money to pay for them all across of what we have hear today, and that is one of the hurdles we have to deal with. Another hurdle of course that stands in the way of a lot of these good ideas is an artifact of the collapse of our electricity system and the hybrid system and the hybrid financing structure we are living with today, and we will grow out of that, but it will take awhile. Then maybe we can generate some enthusiasm and some longer term financing possibilities, but we need to start planning now which is what we are doing. Moving on.

MR. TRASK: I feel like Carnack the Magician here. I hold in my hand the introductions of the last presentation today, and please no clapping.

Our last speaker is kind of a tag team here. We have John Rosenblum who is a consultant and Ann Hancock, who is the Director of the Climate Protection Campaign. They are going to be talking about what is up there on the screen, in an effort to categorize, quantify the greenhouse gas emissions and then how to reduce them from the water and waste water systems in Sonoma County.

I think I will take this moment here to correct something that has been thrown out there quite a bit. We have often heard of the pumping over the Tehachapi as the greatest single pump lift in the world. It is no longer true. It is now in Sonoma County where they pump waste water from Santa Rosa, waste water treatment system up to the Geysers for reinjection into the steam fields up there. John.

MR. ROSENBLUM: First of all, thank you all for staying so long. We should have long been on the road. Anyway, my usual work is just looking for energy efficiency in individual water systems and in waste water treatment plants.

Over the years, what I saw was the lack of integrated responsibility caused a lot of the biggest ideas in energy efficiency and water efficiency to be lost because the jurisdictional differences were just controlling, limiting the scope of the projects that I was working on.

When Ann Hancock asked me to consult for the Climate Protection Campaign and evaluating the greenhouse gas element from water and waste water systems in Sonoma County, it looked like a very good opportunity.

First of all what we are talking about the greenhouse gases, just whatever is generated at the electricity plants that provide the electricity, and I didn't do any sophisticated evaluation of how much Co2 is bubbling off the waste water treatment processes, just the electricity that is coming in. PG & E we assume is about 0.7 lb per KWhr and just use that as a measure.

The first thing we had to do was look at the greenhouse gas inventory. How much energy is being used, let's calculate from that energy that is being used, how much greenhouse gas, how much Co2 equivalence.

Then I took some water supply examples from the Sonoma County Water Agency, some energy efficiency improvements. I'll show you at the Santa Rosa Waster Water Treatment Plant and then some thoughts about how utility rates, waste water rates, water rates are affected by efficiency.

Let's look at the greenhouse gas emissions. What I am trying to show in this graph here, the red is waste water and the blue is water. What I am really trying to show it depends on the population in each city. Well, that is not very interesting.

What is more interesting to most people is okay, when I turn on the faucet in my home at least in Sonoma County, this is about the range each home is generating. When we look at it per million gallons, per gallons delivered, what I am trying to show in this graph is most of these towns are about the same because they are using activated sludge, waste water treatment, and this is very different from Southern California because all of these plants are nitrifying, that means they use about twice as much energy to treat their waste water.

Healdsburg is a very special case because it uses hydro power mostly, it has a contract with NCPA, and their waste water treatment plant needs upgrading last year. It really doesn't comply with the waste water treatment discharge requirements. They are upgrading their plant.

What we are looking at in the county is the Santa Rose Waste Water Treatment Plant is a large regional plant. So, it is about 14,000 tons of greenhouse gasses. The Sonoma County Water Agency which is the main wholesaler to Sonoma

County and Marin County is just as large as that individual facility.

Then all the cities combined which were part of our study were getting up to about 32,000 tons per year of greenhouse gasses. Remember when we talk about greenhouse gases, this means the amount of energy that they use. These are the facilities that we are looking out.

The most important thing for all the decision makers who participate, all the cities in Sonoma Country participate in the Climate Protection Campaign, the most important thing for them is on the books, there are infrastructure improvements in water and waste water that are going to cost more than $ 1 billion. That is the key concern, the money.

Greenhouse gases, yeah, well, Ann Hancock has been very successful in galvanizing political action around the greenhouse gases, but it is really the dollars that are attracting attention and the participation.

We looked at all the treatment facilities, and I am just showing Rohnert Park. for example, we broke down all the different categories of use. This is the electricity that is being used, here is the natural gas. When we translate it into greenhouse gases, the waste water treatment side is about 60 percent. The water supply side is about 40 percent to the greenhouse gases.

Water supply. What we are looking at is typical urban water supply. Most of the water is provided in the summer for urban irrigation, landscape irrigation. 25 percent of the power comes from WAPA which is a hydro power federal government hydro power, the rest 75 percent comes from PG & E, and you can see what happens in summer, that is when most of the PG & E bills come in.

During the summer, they can get up to 8 MW and some of that occurs right on peak. If they wanted to, they could go up to more than 8 MW, but 8 MW is something that often happens in their system.

Looking at the money, this is based on data up until the end of 2002, only 9 percent came from WAPA because it is cheap power, it is about $30 per MWhr, and 91 percent of the dollars are going to PG & E because of this peak over here. They pay about $ 5 million a year for their electricity.

What we are looking at is very expensive urban irrigation, landscaping is expensive. What I did in 2003, they have a SCADA system that tracks all of these different parameters. We looked at 30 minute data for 15 months, very similar to what Lon House was talking about, this is the kind of stuff that we looked at.

The project that we came up with was an improvement in the pumps and improvement in storage, exactly what Lon House was talking about.

The key is well, we get about six percent reduction because the key for this project was to reduce the peak power, and then in greenhouse gases it was about 8 percent. I am just giving these as an example because really it is the money that counts. The 13 percent, $600,000 a year savings and almost -- I'm not going to say all of that, but a lot of this, more than 70 percent of this is reducing peak demand costs.

It would take about $2 million to improve efficiency, make some changes in their SCADA system. They already have all of the sensors that are required to get the information we need to shift to peak, and they can save $600,000.

When we transfer that into greenhouse gas reductions, which was the focus of the Climate Protection Campaign, what we are doing over the 20 year life cycle of the project, save about $320 per ton of CO_2 reduced. So, we are saving money and reducing the greenhouse gases at the same time. That is a very popular kind of message for the Campaign.

This is the way the water agency provides water at the moment. This is our $2 million project, and you can see the $600,000 a year is a sizeable reduction. The key issue is that the Sonoma County Water Agency is facing anywhere in this range of capital improvement projects. They already know that they have to do at least this amount and probably a lot more than this. This is what is in the documents at the moment.

Now the issue is okay, let's not look at $2 million projects, let's try and incorporate our energy efficiency and water efficiency programs into this kind of money.

What they are looking at for the future

is going up to this amount. The key problem is are they really going to have this amount of water from the Russian and the Eel River. There is already litigation going on, but this is the planned intent. This is the increase in electricity bills.

Included about 10 percent water efficiency in the plan, so now this is where the beauty of working with the Climate Protection Campaign comes in. I could go with the Climate Protection Campaign and ask well, what would happen if we went beyond 10 percent water efficiency and we looked very specifically at reducing irrigation demise, landscape irrigation, urban landscape irrigation demise.

We are not talking about agriculture at all. What would happen? The problem for the agency is that asking this question mixes capital costs with operation costs, and water efficiency is an operations deal. This is the way their planning goes at the moment.

It is an institutional barrier that I was happy to hear that IEUA doesn't have because they combine all the water and the waste water and the energy in one institution. I am hoping that is what I heard.

The next problem is that irrigation occurs at the retailer level. Sonoma County Water Agency is a wholesaler, so that is a key. How do you get to all those people who are watering those lawns, so how do you get to them to improve their efficiency.

The energy portion is Sonoma County Water Agency savings. How do you portion any savings that are obtained by the wholesaler back to the retailers.

Waste water reclamation which as we have already explained, a lot of it is already going to the Geysers, but waste water reclamation had nothing to do with the water agency, it is a different institution. So, it complicates matters if you are trying to bring in another agency to help you plan.

Then the big bugaboo is water rights. It is not only if I save water who now gets the water. The Russian and Eel River systems are over allocated. Obviously, some people think they are over allocated, I believe they are. There are problems with fisheries and the question is if I reduce my water demand, does that mean I won't get it back when I need it in 15 years or whatever.

In order to overcome all of these, I could ask all these questions because I was operating as a consultant to the Climate Protection Campaign. It provided me a framework to look at some of the issues that Lon House brought up where most water agencies well, who is going to pay for the sensors, who is going to pay for the over time, so it is not in your scope of work, so don't even ask those questions.

This is what I think happens if we can get some moderate water efficiency in the irrigation sector. What I am trying to show here is that by reducing this peak demand just from the operation perspective, we are reducing about $1.75 million a year in electricity bills.

The key is what is the value of this avoided capital not having to -- designing for this peak demand rather than this peak demand. That is the kind of question we really like to get into, but as I showed you before, just working on energy efficiency, a $2 million project that can save $600,000, that is already quite a good deal.

Looking at waste water treatment, again, we did a data project from the waste water treatment SCADA system, took all of the data and looked, and what we are really looking at is how much air do we have to blow into the waste water treatment, the secondary portion of the waste water treatment system, and can we use less energy to blow air into that system. This is the kind of data we looked at.

Here are the six blowers all 900 horsepower blowers. We replaced two of those blowers with 600 horsepower blowers, and what we get out of it, the energy savings translate to 1,100 tonCO2 per year.

When we look at it, these two blowers are the equivalent of changing the lighting in 1.6 million square feet. The City of Santa Rosa city hall is tiny compared to that. This cost $1.1 million, this probably cost about $1.7 million, but because of the change in occupancy in this, this amount of office space, you would probably have to redo this project three times over twenty years. Whereas the two blowers, are totally in the control of the city and the waste water treatment plant. Over 20 years, well, not nothing is going to change, but this is well within all of their operational capabilities. This one translates to $171 saved per tonCO2 removed.

Here is our little $1.1 million cap and blower project saving $300,000 a year, but the City of Santa Rosa, that regional waste water treatment plant is looking at a capacity expansion project already on the books somewhere between $200 and $600 million. It is a very large expansion.

Again, the question is, if we are looking at this kind of money, why are we just dealing with $1.1 million projects to save energy, why not incorporate the energy into this project.

Looking at some things that can be done. They already have flow equalization for winter flows. If they used it in summer, I estimate anywhere between 30 and 50 percent less peak electricity peak demand for those blowers.

Within this project, they have already got about $50 million to $200 million of process upgrades. Process upgrades if you think them through properly, you can probably use a lot less energy, and at the same time, capture a lot more solids to put into your digester, and they already have the digester. You generate more by gas. They already have the generation facility to generate more electricity at times you really want it.

Indoor water efficiency isn't really a big favorite of the Santa Rosa Waste Water Department simply because the key for their design is winter flow. Winter flow is affected by storm, by infiltration, and indoor efficiency is a tiny amount compared to that.

If you look at expensive electricity during the summer, anything you can do with indoor water efficiency is a benefit because you can, especially if you are focusing on the industrial and the commercial load, you can reduce both the flow and the load coming into the plant.

Because of the way that they look at it, that is in the operations budget, it is not part of the capital budget.

Decentralized reclamation. This is a fancy word for how about some of our facilities using septic systems. There are now packaged septic systems. You can put them in schools, in parks, there is no need to take all of the waste water to the central waste water treatment plant if you have enough area in a school for example, to use a septic and leach.

That was screened out of the EIR initially, and now it is being reinstated is because what the schools have found and what the parks in the City of Santa Rosa have found that under drought conditions, they are losing their playing fields, so it might be worth while thinking this one through, and that is what the City of Santa Rosa is beginning to think about.

The key is that as you reduce this in this summer, you are reducing your expensive electricity demand.

This one truly can reduce capital costs or at least for this system, the system in Santa Rosa and the needs that they have for expansion.

There are system benefits, but again, there is this confusion between what my confusing for them capital budgets and operations budget, it is something that the elected officials in Santa Rosa have to grapple with how to because they have their charter city, and they have a Utilities Commission. They have to find a way to properly integrate those two.

Energy efficiency. You go to a waste water treatment plant and as long as you are talking about pumps and motors, it is fine, they will listen to you. The largest energy efficiency savings come from improvements in the treatment process itself. Looking at treatment process, you then begin to make everyone nervous about will they be able to stay in compliance.

With modern technology and new modern controls technology and the way we understand treatment processes at the moment, it is worthwhile looking at this. I believe that is where the big savings are.

For instance, in Southern California where or at least in San Diego County where you don't have to nitrify. In summer, most of the plants are nitrifying because of the heat, but if you have a control system that prevents the plant from nitrifying, then what you are doing is reducing the energy requirement for blowing air into the secondary process. You are reducing it by 50 percent, and I've seen that in several plants.

The next is look at water efficiency. That is the other side, it is the water supplier's responsibility to look at water efficiency, and Gary Wolff's example about the washing machines, this is exactly where it occurs. Someone else's calculating that benefit.

The whole issue of you know, I was trying to promote decentralized. The whole issue here is centralization so that you get safe handling of waste water. This is a major concern. They are afraid of this, but what I was thinking of an not just me, what people are thinking of in this kind of thing is the City would still operate this decentralized systems.

Again, I was able to look at this because I was working for the Climate Protection Campaign.

Now let's look at efficiency and rates. The Santa Rosa Waste Water Treatment Plant, this is the way the rates come in. PG & E is about 19 percent of their operating costs. Usually the argument is well, even if you save me 10 percent of my electricity rates, it is really not affecting this 80 percent, so I am not sure it is a good idea to invest.

When you look at the fixed costs of a waste water treatment plant, the capital that amortization of the capital investment represents about 50 percent, so that changes the picture. What we are really looking at in the rates is 40 percent of the decisions made on capital costs that take you out the next 20 years, so what really my whole message is and the Climate Protection Campaign's message is if we want to promote energy efficiency and water efficiency and reduction of greenhouse gases, let's look at using less so we have to build less.

Let's look at where the really big dollars are, let me put it to you bluntly like that because there is more chance that action will be taken if we are really talking about the main capital decisions.

Okay, so just to summarize what I've been babbling about. There is about $ 1 billion worth of infrastructure costs that need to be invested in Sonoma County. There is opportunity for regional water savings, energy, and water, and dollars. The same applies for waste water.

Then when we look at the increasing concern for greenhouse gases, well, it looks as though in the water and waste water systems, we can actually reduce greenhouse gases and save money.

Now that is all well and good, but there needs to be in this case, in Sonoma County, there needs to be some kind of institutional frame work to help us do the planning because we need to integrate the water side with the waste water side with the energy side in order to create the willingness to go ahead. That is where the Climate Protection Campaign comes in, and I am going to turn it over to Ann to explain how this came about.

MS. HANCOCK: Commissioner, members of the public, my name is Ann Hancock. I am the Coordinator/Director of the Climate Protection Campaign in Sonoma County. I am going to give you about a five to ten minute sketch, and it is going to be less technical and more how we mustered the political wheel, and what we are doing currently in Sonoma County.

We followed the Cities for Climate Protection Program. This is a program advanced by ICLEI, and the national headquarters is in Berkeley. It is a program followed by over 600 local governments around the world, 150 of them in the United States.

It is meant to capitalize on the access and the power of local action. The motto of the Cities for Climate Protection and ICLEI is that local action moves the world.

So, it is very exciting to be part of this movement that saves money, reduces greenhouse gas emissions, and has us doing the right thing, and connects internationally with a very exciting program.

This is a graph that shows you how the program is organized. We follow five steps and go along two tracks. The five steps are to do an inventory of your greenhouse gas emissions, create a target for reducing your emissions, make a plan for achieving your targets, implement your plan, and monitor and adjust.

You do that for internal operations and you also do it community wide. It is a voluntary program so cities and counties set their own pace, and they make their own targets, and they can follow this plan, actually in different sequences if they would like to.

Just to kind of give you an analogy of the simplicity and the logic behind this plan, I would like to use a weight reduction program. You get on the scale, you go oh my gosh, I need to lose weight, 20 pounds, I am going to diet and exercise, then you go on your plan, and then you keep stepping on the scale and you find out how you are doing, and you monitor and adjust.

We have all ten of our municipalities, nine cities and the county pledge to reduce their greenhouse gas emissions. This is the first time in the nation that 100 percent of the jurisdictions in a county have committed themselves comprehensively and completely to climate protection.

We set a second national precedent in that 100 percent of them have completed their base line greenhouse gas emission inventories for their municipal operations.

Five out of ten of them have set their targets, so on this top track for municipal operations, they have all done their inventories and half of them have set their targets.

Community wide -- I am going to come back to that actually. I'll come back to the target too.

This is a picture of the day when we achieved our first national precedent when 100 percent of our local jurisdictions had completed or signed onto the Cities for Climate Protection Program, that is at our Board of Supervisor's meeting, that is Mike Kerns, he was the Chairman of the Board the time, and he is shaking hands with Ryan from ICLEI, and there is all of us celebrating.

One of the things that is currently going on is that there are four programs combining to bring in technical assistance to help the cities and the country achieve their goals in the Cities for Climate Protection Program.

There is CALEEP as you mentioned, Martha, right? We are one of the six projects in the State of California that the CALEEP Project is dealing with.

Then there is also the local government energy partnership that the Association of Bay Area Governments is working on. The Bay Area Air Quality Management District has given us a small grant to conduct two studies, and then the Climate Protection Campaign, of course, is the fourth partner.

Another thing that happened recently is that the City of Santa Rosa held a conference for business. It was called Climate Protection Everyone Profits. Two of our key speakers were Margaret Bruce from the Silicon Valley

Manufacturers Group where business there has led a very impressive effort to commit themselves regionally to Climate Protection, and they have set a target that made national headlines. They agreed to a 20 percent below 1990 levels, greenhouse gas reduction target by 2010, and this is three times kyoto. It is very very exciting. We were hoping that Margaret could inspire some of our businesses there in Sonoma County to follow suit.

Also our second speaker was Terry Tamminan, Governor Schwarzenegger's Cabinet Secretary, and we were hoping, and Terry said he would, consider an initiative between the State of California and Sonoma Country where Sonoma County could be the petri dish for the state in trying out some of its exciting ideas for how to dramatically reduce our greenhouse gas emissions.

Thanks to the Bay Area Air Quality Management District, we did do an inventory community wide of our commercial and residential governmental emissions. This was through four sectors: electricity and natural gas, transportation, solid waste, and agriculture.

Our key finding was that our greenhouse

gas emissions increased by 28 percent between 1990 and 2000, and this is double the national rate.

In Sonoma County, we pride ourselves in being environmental and ecologically oriented, and here we are with double the national rate of an increase, so you can see what a huge challenge we have on our hands.

This graph represents the choices that we have for the future. The black line shows business as usual, keeping on our 28 percent increase. The green line at the bottom shows the ecological imperative, the scientific imperative. Scientists tell us that we need to reduce our greenhouse gas emissions between 50 and 70 percent to stabilize the carbon dioxide in the atmosphere.

We haven't talked really about the horrible consequences that scientists tell us are ahead for us if we don't do this.

There are other lines there that show us a range of some of the options that we could take in setting our greenhouse gas emission target.

We are bringing together 40 to 50 members throughout our community on May 21 to see if we can come to agreement about who our target should be and then we will take that recommendation back. We will take it back if we reach agreement to our (indiscernible) for consideration for adoption.

Climate protection. What we are up against is not really the science and technology. The scientific and technological solutions exist, and this is very important to realize, but what we are up against is the public will.

This topic is so very scary that most people are in a deep state of denial. Cognitive linguists tell us that in order to compel action, in order to bring people to action to want to even take action, we have to talk about it in a different way. They say metaphorically, we need to go from chicken little to the little engine that could.

In Sonoma County we have taken it a step farther. We say that people who protect the climate are very very cool. We like to think of ourselves a little bit like in the Matrix, and we are translating this to our local elected officials and our staff people who are working on this in the various cities and counties.

This is Jane Bender, the mayor of Santa Rosa, and Eydie Tacata, who is a staff member of

Rohnert Park, and they've got the coveted dark glasses award, the first time ever given for being very very cool and being our climate protection champions.

Second to the last point here. We feel that climate protection offers some very important opportunities.

First of all that it is comprehensive and compelling, that it integrates a broad spectrum of issues, not only water and energy, but forestry and transportation and actually land use. If you extend it even further, public health and national security, that it provides a very important nexus.

The metrics of sustainability, that greenhouse gas emissions is one of the most important metrics that we can use if we want to navigate towards a sustainable future.

Also a very important paper came out last summer from Ned Reynolds, and we have it posted on our website. He argues, and I think very affectively, that climate protection is a key driver for energy efficiency, that it needs to come out of the closet. That was the title of his paper, so I urge people here to take a look at

Ned's paper and see what you think of the case he makes about climate protection as a key driver for energy efficiency.

This photograph we took, it is an elected representative from each of our municipalities and they were invited to bring with them a child who represents the future to them, and then we had a hybrid vehicle and a solar panel. This is in our Luther Burbank Gardens right down town in Santa Rosa.

What this picture represents is that we are standing together for the future, and what we envision is that in 50 years or so when our children's children are looking back at us, that they can look back at us and say, we are living well because of what they did on our behalf. Thank you.

COMMISSIONER BOYD: Thank you, Ann. A couple of questions and a comment. Does Sonoma County belong to the state's voluntary registry?

MS. HANCOCK: No, we do not.

COMMISSIONER BOYD: Have they considered it?

MS. HANCOCK: No, I don't think any of them have considered it, and you know, I myself am going to the registry conference on the 19th, and what we understand is that it is more oriented towards a business model. You are saying no --

COMMISSIONER BOYD: I think it is open to all comers, and if you are going to the event, well, I will see you there and introduce you to the president and we will take it from there.

MS. HANCOCK: We will take a look at that.

COMMISSIONER BOYD: Secondly, I am just curious as to whether you have had any interaction with the climate staff of the Energy Commission. I am impressed by what I've seen. I hadn't heard that your county and its municipalities were this deep into the subject. I was just wondering if our paths have just not crossed agency to agency.

MS. HANCOCK: I don't think our paths have crossed.

COMMISSIONER BOYD: I chair the Climate Advisory Committee which just met the day before yesterday for the fourth time. ICLEI is a member, the Silicon Valley folks are members, etc. We should talk off line more about a connection between our agency and what you are doing because it is fairly impressive.

On the thesis of climate protection as a driver for energy efficiency, that is a very interesting statement, and I agree with it. I think in California, which has earned its way into some of the international associations involved in climate change, it is because energy efficiency has been such a driver in California for so long, that we rate very well as a climate state.

I mean we are the most efficient state in terms of electricity use per capita on our emissions per capita, we rank better than most states in this country, better than some of the countries in the world. Not the best, but we've got a pretty good batting average, and it is obviously a fairly aggressive state.

You are right, there is a huge linkage between those two subjects, and you've just to let you know, you've peaked my curiosity a little bit about -- I mean we are picking our way through an inventory of greenhouse gas emitters in this state, industries and what have you. That is some people's approach to the targets -- well, I don't want to say targets, that scares some people, but the areas to look at for future reduction, and I won't rattle off the list.

Part of success is having a climate within the industry, and in this case a municipality or a regional government to attack some of the issues, and I am impressed that you have connected the water and climate change issues, so you will be hearing from us, we would like to talk about it more. You may move something up our agenda just because you can get some enthusiasm for action in the arenas vis a vis arm wrestling with some unnamed industry over what they should be doing.

Anyway, it is very interesting, thank you.

MS. HANCOCK: Thank you very much.

MR. TRASK: Any other comments or questions?

MR. WOLFF: Question for either Ann or John. What percentage of the greenhouse gas emissions in county are resulting from water management?

MR. ROSENBLUM: Off the top of my head, it is about 2 percent.

MS. HANCOCK: About 2 percent.

MR. WOLFF: That is without accounting probably for the customer side of the meter?

MR. ROSENBLUM: Exactly, we are not accounting for customers. The key was that the savings are so large that out of that 2 percent, we can probably cut a large amount and save money to go off to what you are talking about, the larger issues in the homes.

MR. MAINLAND: Commissioners, my name is Ed Mainland. I am co-chair of the Sierra Club of California's Energy Climate Committee. I had a question for our speakers.

First of all, it certainly sounds like they have something going in Sonoma that is worth emulating statewide, but my question is, is it possible to calculate the greenhouse gas emissions from large entities, large systems such as the Metropolitan Water District or the Inland Empire District, and is it possible to calculate those and then set targets for reduction on that scale similar as your smaller municipalities are doing?

MR. ROSENBLUM: It was pretty simple to do it in Sonoma County. All we did was look at all the different accounts and with power data bases now, it can go after them. I think that was the point of Gary Wolff's presentation on the model.

It might be easier to do it for the Metropolitan Water District than trying to do it across the entire state.

MS. DAVIS: The answer is, yes, and at the Inland Empire Utilities Agency, we've started on the process through the dairy digester. We are actually anticipating being -- we are marketing greenhouse gas reductions right now through the Climate Exchange, the Chicago Climate Exchange, specifically through the reduction in methane gas, greenhouse gases through the digester projects.

MR. WOLFF: I should also comment that for a water system, anyone who wants to enter the different components of their water system into our watered air model that is available on our website for free download can enter the components of their water system, the amount of energy used by each component, the sources of energy, you know the type of energy, natural gas, coal, hydro, whatever it is, and the model calculates eight categories that are pollutant emissions from that scenario for water use. One of them is carbon dioxide.

MR. ERICKSON: Commissioners, my name is Dave Erickson, and I work on Climate Protection

Campaign with Ann. I've actually been doing a lot of the data work to support Ann's work and also John's work collecting data for the different users emitters in Sonoma County.

John's work is really interesting to me. I have an engineering background, and this is a new field for me, but it is interesting. I think what I've seen John say that I think is unique is he has or is developing this concept of micro, both water and waste water handling similar to a distributed generation concept for energy.

I think what he is saying is by distributing both the production and the emission side of water and waste water more, you can get huge energy savings over and above what you would see if you spent that money on developing infrastructure if I am making sense.

I've been to one of these workshops before, and I am curious that nobody is really talking about distributing supply in terms of harvesting rain water. This is something that has been talked about quite a bit. It is extremely energy non-intensive, in fact, it can be completely encapsulated on at least in a residential area, driven basically off grid, and certainly can be used to supply a lot of the irrigation needs if not drinking water needs. That is one side.

Then on the other side, gray water processing, that is another thing that has been talked a lot about. Again, done on an individual residence basis, and extremely energy non-intensive. These are more efforts where you are really working on distributing the functionality more, and where you see an enormous drop in energy use from what I have been able to tell.

I just wonder if John might comment on that.

MR. ROSENBLUM: The specifics of storm water and probably Bob Wilkinson and Martha Davis have better real results from trying to recharge groundwater. That is where capturing storm water really counts, not allowing it to run off.

My point mainly is that if we thought about saving water or water efficiency and funded water efficiency the same way that we funded the expansion projects for water supply, the expansion project for waste water treatment, then we would get a lot more efficiency. That reduction in waste water then will generate a whole lot more energy efficiency just reducing the demand.

What I was trying to show particularly here in these slides was reducing the peak demand which seems to be the number one dollar amount. That is where I was going, not using water gives us all the benefits instead of building more infrastructure to supply water.

MR. KLEIN: How successful have you been at convincing these agencies that they have to look at the O & M along with the capital. I assume it is two different departments and they are not allowed to talk to each other.

MR. ROSENBLUM: They talk to each other. The Santa Rosa project that I showed you with the blower definitely that was implemented, and that was done. I did the evaluation at the city's expense, they then went out and got a loan from the Energy Commission at that time when money was available.

Since then, they have just gone ahead with process control improvements, and they are making headway. The water agency has been a much tougher nut to crack, and Lon House explained a lot of resistance.

The Sonoma County Water Agency the key

issue as I pointed out there was the water rights. Until there is an agreement over the water rights, there is a lot of resistance. The water agency has said that if their retailers first optimize their pumping and storage, then they will be willing to implement that project and identify it for them. It has been very difficult.

MS. HANCOCK: I wanted to also comment that -- I am going to say the obvious, but it is a process, and one of speakers at the Business and Climate Change Conference, I think she was from Christofferson Homes, she said the first obstacle that we have to overcome is the mindset.

Ever since she said that, I went, yes, it is the mindset. That is part of what -- I mean people don't especially don't want to deal with global climate change, and they don't especially want to try out these new technologies, and so how do we bring innovation in. The first thing we have to overcome is the mindset.

It is a process, and you can be very very cool by doing some of this stuff and save money at the same time, then there is hope I think.

COMMISSIONER BOYD: Some how or another,

you lured everybody out of their tribal caves to sit around the bonfire and make some progress over in your county, so I am kind of impressed.

MR. TRASK: Any other questions, comments? We had a discussion panel scheduled for after this session, but I have a feeling if I proposed to do that, I would probably have large objects thrown at me.

COMMISSIONER BOYD: We should ask if anybody wants to make any kind of a comment in closing here rather than pulling the panel together, but throw the floor open for a few moments. I am tolerant for a little bit more time.

MR. TRASK: That is just what I was going to do.

COMMISSIONER BOYD: Okay, very good.

MR. TRASK: Mary Ann.

MS. DICKINSON: I am Mary Ann Dickinson, California Urban Water Conservation Council. You heard from me at your workshop in January, so I don't want to repeat any of the comments that I made at that time except to say that I noticed today you've received a lot of suggestions about programs that might be comparable to the spray valve program that we ran at the Council. Programs that save water and energy and that would be of benefit to the IOU's in their public benefits goods charge funded programs.

I want to make sure that the Energy Commission has a role in helping to advise that linkage. I think that is very important. I think the Energy Commission would have a much better influence in the selection of those programs that we sort of party people that apply on the outside for that.

We have been wanting to do those kinds of programs for a long time, and it wasn't until the PUC opened it up to third party program financing that we were finally able to get that spray valve program launched. I am not trying to say that the IOU's are receptive, but who were we, the California Urban Water Conservation Council. We were just some little podunk non-profit.

I would like the Energy Commission to take some of the recommendations that I know are going to come out of Matt's paper and your work over the course of the year and use its influence to try and get some of those good ideas that you will hear over the course of the year actually on track to some kind of implementation.

We have set up all of our feetums of funding, and it is very hard for well meaning organizations to pierce those boundaries. I just wanted to make that comment.

COMMISSIONER BOYD: Thank you. I guess a worry that I have as a result of all we heard today is just money. We heard a lot of ideas, and the difficulty is going to paying for it. Although we do harvest a fair amount of money through the public goods charge on electricity and now apparently a new one that harvests a lot less on natural gas. I am sure all of that put together is not enough money to do a lot of what we want to do. We are talking about energy efficiency and savings and using the water system to do it.

I am just wondering out loud here if we can't aggregate enough water efficiencies to dream of the idea that a water public goods charge to help finance some of this in any event.

MR. ERICKSON: I'd like to pick up on that point, Commissioner. First of all, let me compliment the Energy Commission for what you are doing with this Integrated Energy process because you've opened it up to water, but as we are discussing, you've got the climate dimension, you've got some other very interesting benefits in all this.

I would urge that this be part of the report, looking at the operating end capital cost savings in an integrated economic sense as well as a policy sense, and that may be one of the sources of funding, if you will, the payback on the integrated basis. As Gary pointed out, one small example, but there are of course many, I think is the ticket to vastly improved policy options and in a time and tight budget, state and federal, and all the rest, I think that could be very attractive.

I think you are really on to something. I would hope that CALPA, Alan Lloyd's job could be integrated into the process a bit more because of the air quality, part of what we are describing with greenhouse gas emissions are calculated on an avoided energy basis, so we have criteria pollutant benefits as well.

So, we've got water waste, water, air, climate benefits, and we really ought to come up with a way to begin accounting for that as one package to inform public policy. I think it is quite exciting. Thank you.

COMMISSIONER BOYD: Good point, and I had many a discussion with Alan Lloyd about this, and I'm sure there will be some progress. You know, I spent 20 years in the air quality business and I am still amazed at how hard it is to lure people out of their respective caves to come and talk about things in common.

Now that I have changed caves -- in any event. Excellent points, and I appreciate that. I think the beauty of this -- like I said at the beginning of this, and I've said this many times, what I really like about the Integrated Energy Policy Report besides the fact that it keeps me at hearings non stop week in and week out, is the fact that you get a lot of people gathered together and there is a huge synergism and a lot of these kinds of things are recognized, and my pet thing, the system, the system. People are identifying the parts of the system, talking about the parts of the system, seeing it as a systems issue, and society and the environment can only benefit from putting more of that together as Sonoma County has accomplished in not so small an arena. It is just a small example kind of thing to do.

Some of this is the cost effectiveness, cost benefit, some of it is going to be where a positive political with a small climate, i.e. a willingness for folks to do some of this stuff. So, we will just try to capitalize on all of those things. Obviously, everyone who hung in here to the last minute is enthused enough to want to do that.

We have had a good representation from various water agencies and associations of water agencies, and I appreciate that today and MWD and our friend at CalFED have sat out there the whole day. I am not sure if DWR is in the room or not, but could have been. They were, okay, well, it is Friday, what the heck.

MR. ERICKSON: Dave Erickson. I just wanted to applaud the Commissioners on their acknowledgement of the greenhouse gas emissions issues as being a problem and something worthy of including in policy deliberations, and I just wanted to point out as an overarching consideration, it is a nice umbrella for considering any kind of energy policies.

Now I noticed for example that there are several of the presenters we are talking about using diesel engines, using various kinds of internal combustion engines, and I think it sounds to me like there is opportunities for incentivizing alternate fuels of various kinds.

The greenhouse gas rubric I am only pointing out serves to pull in a lot of things into the mix that you might not otherwise consider as far as minimizing or fine tuning the system to minimize greenhouse gas emissions.

Thank you.

COMMISSIONER BOYD: Thank you. Climate change has its own parallel track as part of this whole IEPR process, and we hope to pull those things together.

I chose not to get involved in the BUGS back up generators, i.e. diesel generators discussion that was prompted a little earlier, but you have thrown the issue back on the table.

I lived through every agonizing moment of the electricity crisis, and we as a state resisted strongly to the -- well, all the way through the process not to fire up those diesel generators. They are a big resource, the idea of alternatively fueling them or changing them in some way is intriguing or interesting, but hopefully they will. Maybe some day something can be resolved, but for air quality reasons we hung on to the bitter end not to add them to the system nor to add these string of 20 locomotives or this that and the other that were proposed in the process.

In any event, it is a resource if it were only operable clean. As we talk about redistributed generation, I guess that will have to be in the discussion because they are out there. Things can be done to make all of our generation sources be as clean as possible. So, it is certainly not precluded from future dialogue. Just don't say diesel. Internal combustion is a much better word.

MR. TRASK: Maybe I can paraphrase something Gary said earlier. I've already forgotten it. Never mind.

COMMISSIONER BOYD: Gary was quite scared.

MR. WOLFF: I might remember it if I knew what he was talking about.

MR. TRASK: I've got it now, it is

operating an emergency diesel is the problem, it is not the solving of the problems.

COMMISSIONER BOYD: Any other comments, questions? If not, I thank you all for hanging in to the bitter end on a Friday, and I appreciate your attendance, and this meeting shall stand adjourned.

(Thereupon, at 4:52 p.m., the workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of April, 2005.

Peter Petty